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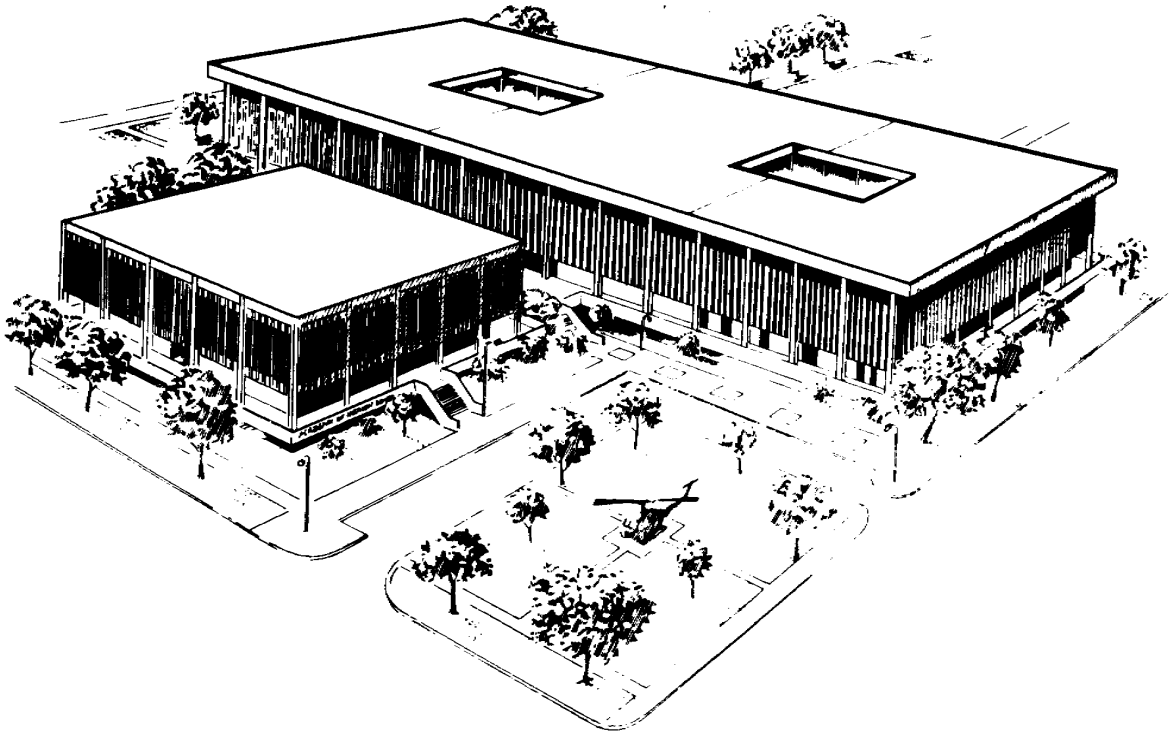
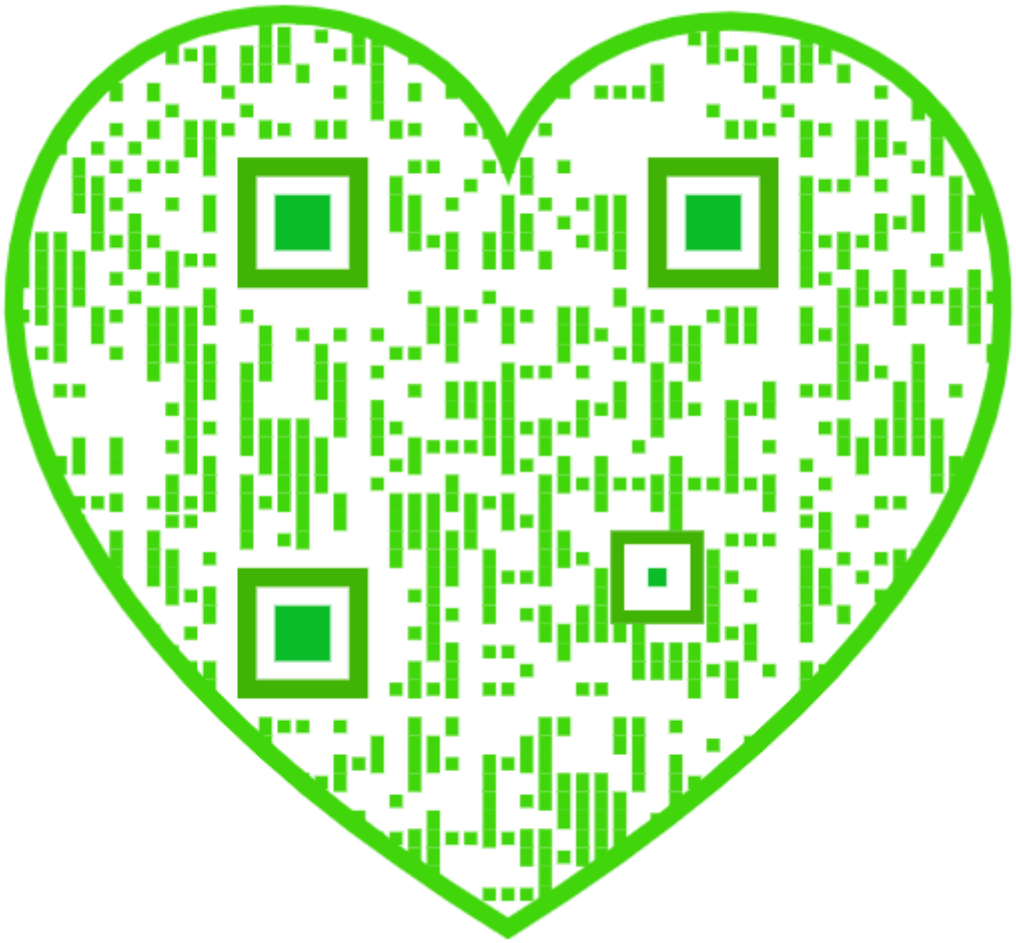


INFECTION CONTROL AND DRUGS IN THE DENTAL CLINIC

SUBCOURSE MD0509 EDITION 200



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CLARIFICATION OF TERMINOLOGY

When used in this publication, words such as "he," "him," "his," and "men" 'are intended to include both the masculine and feminine genders, unless specifically stated otherwise or when obvious in context.

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CORRESPONDENCE COURSE OF
THE U.S. ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL

SUBCOURSE MD0509

INFECTION CONTROL AND DRUGS IN THE DENTA CLINIC

INTRODUCTION

Dental specialists assist dental officers in many aspects of patient care. A very important part of patient care is infection control and maintaining a high level of cleanliness in the dental treatment area. One of the purposes of this subcourse is to provide you with knowledge concerning disease transmission, individual measures for protection against infection, methods of sterilization, storage of sterile items, disposal of regulated waste, and chemical disinfection of equipment.

Dental assistants also need to be familiar with the various drugs involved in dental therapy, even though dental officers are solely responsible for prescribing the drugs. Terms related to drugs are reviewed, and drugs commonly used in dentistry are described, together with their uses.

Subcourse Components:

The subcourse instructional material consists of three lessons And an appendix as follows:

Lesson 1, Disease Transmission and Standard Clinical Procedures.
Lesson 2, Sterilization and Disinfection.
Lesson 3, Drugs in the Dental Clinic.
Appendix, Drugs Commonly Used in Dentistry

Here are some suggestions that may be helpful to you in completing this subcourse:

--Read and study each lesson carefully.

--Complete the subcourse lesson by lesson. After completing each lesson, work the exercises at the end of the lesson, marking your answers in this booklet.

--After completing each set of lesson exercises, compare your answers with those on the solution sheet that follows the exercises. If you have answered an exercise incorrectly, check the reference cited after the answer on the solution sheet to determine why your response was not the correct one.

Credit Awarded:

Upon successful completion of the examination for this subcourse, you will be awarded 10 credit hours.

To receive credit hours, you must be officially enrolled and complete an examination furnished by the Nonresident Instruction Branch at Fort Sam Houston, Texas.

You can enroll by going to the web site http://atrrs.army.mil and enrolling under "Self Development" (School Code 555).

A listing of correspondence courses and subcourses available through the Nonresident Instruction Section is found in Chapter 4 of DA Pamphlet 350-59, Army Correspondence Course Program Catalog. The DA PAM is available at the following website: http://www.usapa.army.mil/pdffiles/p350-59.pdf.

LESSON ASSIGNMENT

LESSON 1	Disease Transmission and Standard Clinical Procedures
TEXT ASSIGNMENT	Paragraph 1-1 through 1-14.
LESSON OBJECTIVES	After completing this lesson, you should be able to:

1-1. Identify characteristics of bacteria, fungi, and viruses (microorganisms).

1-2. Identify the defense mechanisms of the body.

1-3. Identify types of diseases that can be transmitted in a dental clinic.

1-4. Identify the importance of environmental cleanliness for infection control.

1-5. Identify precautionary measures taken to avoid cross infection.

1-6. Identify the steps of the three-hand washing technique required of all dental health care workers.

SUGGESTION After completing the assignment, complete the exercises at the end of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 1

DISEASE TRANSMISSION AND STANDARD CLINICAL PROCEDURES

Section I. MICROBIOLOGY AND DISEASE TRANSMISSION

1-1. MICROBIOLOGY

a. Microbiology is the study of microorganisms, including bacteria, fungi, and viruses.

b. Microorganisms, also called germs or microbes, are a common cause of disease. They exist in almost every environment on earth. Three types of microorganisms are bacteria, fungi, and viruses. The word "micro" implies that microorganisms are extremely small and not visible to the unaided eye. However, when bacteria or fungi grow into a mass, they can sometimes be seen by the unaided eye. Most bacteria and fungi are capable of growing in or on common laboratory culture media (nutrients). Viruses and a few bacteria require living tissue cells to support their growth and reproduction. Bacteria, viruses in tissue culture, and some fungi grow well at 95ºF (35ºC), whereas many fungi grow best at 77ºF (25ºC).

1-2. BACTERIA

The three basic shapes of bacteria are coccus (spherical), bacillus (rod like), and spirochete or spirilla (corkscrew). See figure 1-1. Cocci may be arranged in chains (strepto), clusters (staphylo), or pairs (diplo), depending on the specific microbe. See figure 1-2. In addition to appearing in various specific arrangements, bacilli tend to occur in a wide variety of sizes and forms. A few bacilli produce spores that are highly resistant to harsh environmental conditions, such as moderately high temperatures and certain chemicals. The gram stain is often used to aid in differentiating bacteria.

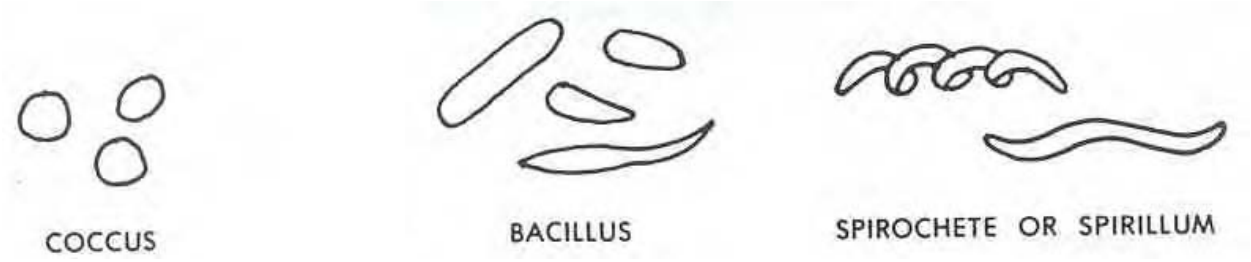


Figure 1-1. Shapes of bacteria.

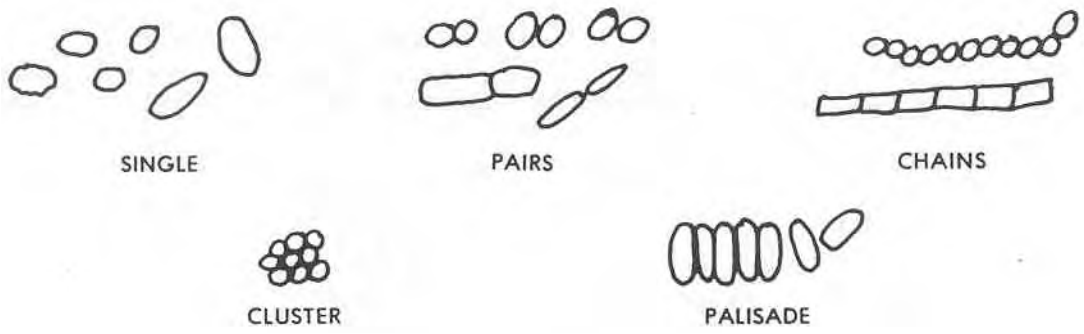


Figure 1-2. Bacterial cell arrangements.

1-3. FUNGI

Two types of fungi are molds and yeasts. See figure 1-3. Molds usually have branching filaments on which various types of spores are produced. Yeasts are usually large, round, or oval cells that reproduce by budding. Fungi are usually much larger than bacteria.

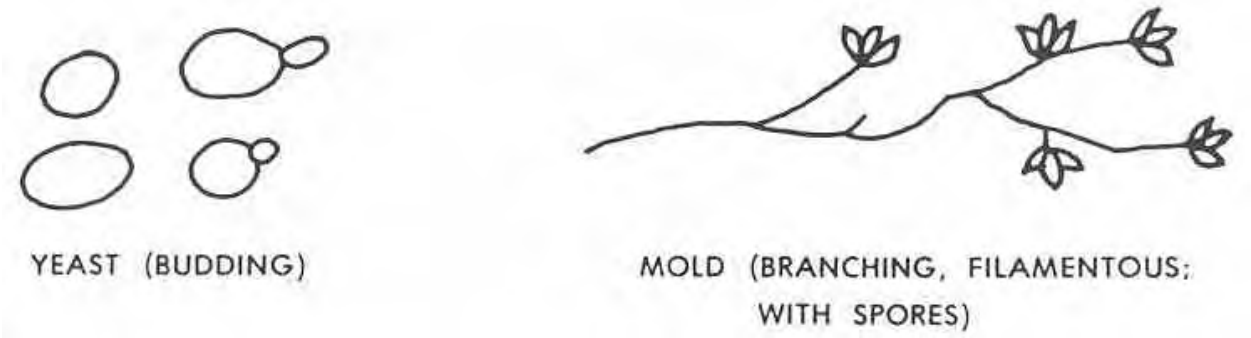


Figure 1-3. Types of fungi.

1-4. VIRUSES

Viruses that infect humans have a variety of shapes and structures ranging from rod like, to oval, to spherical. See figure 1-4. Compared to bacteria and fungi, viruses are extremely small. Viruses can be observed only by the use of an electron microscope.

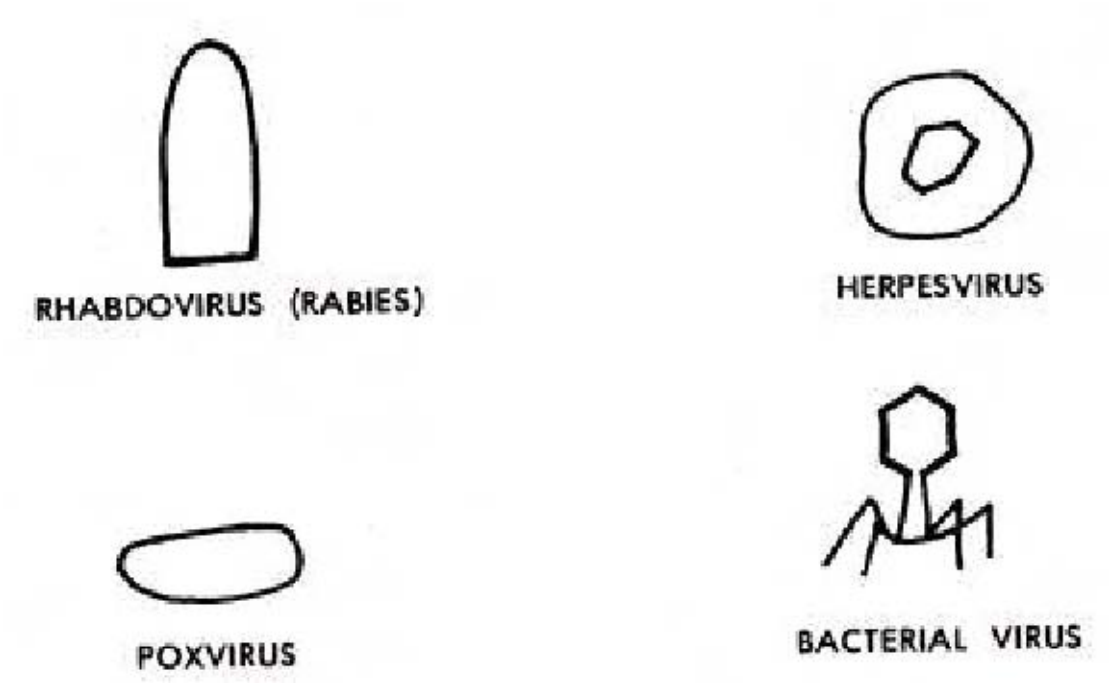


Figure 1-4. Shapes of viruses.

1-5. MICROBES IN THE MOUTH

Microbes normally inhabit certain parts of the body, such as the normal, healthy adult mouth that has a highly varied and concentrated population. The saliva from the dorsal surface of the tongue contains about 750 million bacteria per milliliter (about 20 drops of saliva). Although the types of bacteria are different, plaque and the gingival sulcus contain one hundred times this number. Facultative streptococci (bacteria that thrive either in the presence or the absence of oxygen) are the most numerous. They account for perhaps 50 percent of the total count. Lactobacilli, although often implicated in dental caries activity, account for only a small fraction of the total count. Oral spirochetes are anaerobic (require the absence of oxygen) and inhabit the gingival sulcus. Certain fungi, such as Candida albicans, may also be present. Various normal microbe populations safely exist in an oral environment until something such as antimicrobial therapy, poor oral hygiene, improper diet, or periodontal or other disease upsets this environment.

1-6. TRANSMISSION ROUTES FOR INFECTIONS

a. **Through the Respiratory Tract.** Infections may be transmitted via airborne droplet into the respiratory tract. Examples include the common cold viruses, influenza viruses, and tuberculosis bacteria.

b. **Through the Gastrointestinal Tract.** Infections may be transmitted via contaminated food or other entry into the gastrointestinal tract. Examples include dysentery and diarrhea.

c. **Direct Personal Contact.** Infections may be transmitted via direct personal contact. Examples include hepatitis and syphilis.

d. **Opportunistic Microorganisms.** Normal flora microbes may become opportunistic pathogens under certain circumstances. Examples include the bacteria causing dental caries and periodontal disease.

1-7. DEFENSE MECHANISMS OF THE BODY

The body has developed defense mechanisms to control and to cope with the constant attack of microorganisms.

a. **The Skin and the Respiratory Tract.** The skin acts as the first line of defense by being bactericidal and fungicidal through sebaceous secretion of fatty acids and by the presence of native bacteria. The respiratory tract acts as an efficient air filter. The tortuous passage of air through the nasal turbinate effectively filters objects heavier than air (for example, dust). Cilia in the bronchi act in a flagellating (sweeping) manner to expel foreign material and to bring it to the throat where it is swallowed or expectorated.

b. **White Blood Cells.** Another defense mechanism is the phagocytic action of white blood cells and macrophages in the reticuloendothelial system (RES). While white blood cells circulate throughout the body, they concentrate at sites of serious infection and inflammation. Fixed phagocytic cells (which line vascular and lymph channels), as well as wandering phagocytic cells, ingest invading agents in tissues.

c. **The Immune System.** The immune system is a complex phenomenon involving antigens and antibodies. Antigens are foreign proteins that elicit immune reactions in the body. Antibodies are substances manufactured by the body in response to an antigen. The antibody combines with the antigen to remove or deactivate it. Active and passive are two types of immunities. Active immunity is achieved when a person manufactures his own antibodies in response to an antigen. Passive immunity is achieved when preformed antibodies are administered. These preformed antibodies are manufactured by another person or an animal that was previously actively immunized against a specific antigen.

d. **The Alimentary Canal.** The alimentary canal is a defense mechanism that destroys harmful bacteria in the stomach by gastric acids (pH 1.0 to 3.5). In addition, the abundant population of microorganisms existing in the lower colon produces essential vitamins (such as vitamin K, biotin, and pyrodoxine), indirectly supplementing other defense mechanisms.

e. **The Eye.** The mucous membrane of the eye is still another defense mechanism. It resists infection by lacrimal secretions (tearing) containing wandering phagocytes and lysozyme (an enzyme which destroys bacteria).

1-8. TYPES OF DISEASE TRANSMITTED

The dental specialist must be aware of some diseases that can be transmitted in the dental clinic. Being aware of these diseases will make sterilization and disinfection procedures more meaningful.

a. **Hepatitis.** Hepatitis is a disease caused by a virus that, even in mild cases, damages the liver. In severe cases, liver necrosis is common. Two types of distinguishable hepatitis are Hepatitis A and Hepatitis B. Hepatitis A is usually spread by fecal contamination of food or drink. It has an incubation period of about 30 days. Hepatitis B is spread by injectables and instruments that have come in contact with contaminated blood or serum. It has a much longer incubation period (perhaps several months) than Hepatitis A. The risk of infection exists between patients and between the patient and the dental specialist.

b. **Influenza and the Common Cold.** Influenza, the common flu, is spread by an airborne droplet and consists of many different antigenic types. Therefore, it is difficult for a vaccine to be completely effective. New antigenic types are produced by mutation of the viruses. The common cold is caused by two or three different viruses, each of which may have many antigenic types.

c. **Tuberculosis.** Tuberculosis is spread by an airborne droplet. Inactive tuberculosis occurs when the bacteria are walled off by the fibrous tissue. A positive antibody test merely indicates present or previous infection with the tuberculosis bacteria. A positive test result should always be reported to the dental or medical officer. Tuberculosis of the oral mucosa occurs if wounds or erosions become infected by tubercle bacilli contained in the sputum. The oral lesions vary greatly in their appearance. The tongue is the most frequent site for these lesions. Antibiotics are effective in the treatment of certain types of tuberculosis. Tuberculosis is becoming more common, and drug-resistant forms are appearing.

d. **Syphilis.** This is a venereal disease caused by a spirochete. Since the spirochete is anaerobic, it cannot survive for long when exposed to air. It may live long enough to effect transmission if immediate contact is made with contaminated instruments. Clinically, contact is made by an open wound or by contaminated instruments penetrating the oral mucosa.

e. **Gonorrhea.** This is a venereal disease caused by a gram-negative diplococcus. Primary infection is by genital contact. Secondary infection is possible via the hands or by contaminated instruments.

f. **Candidiasis (Moniliasis; Thrush).** Candidiasis is a surface infection of the mouth caused by a yeast-like fungus. This fungus is normally present in the mouths of healthy persons. When natural resistance is lowered, this infection may appear and grow. It may affect newborn infants, patients receiving certain antibiotics, and adult patients debilitated caused by alcoholism, leukemia, diabetes, or immune system deficiency.

Section II. PROCEDURES FOR PROTECTION AGAINST INFECTION

1-9. GENERAL

Dental patients and dental health delivery team members are all sources and potential victims of infectious disease. Disease can be easily transmitted in the dental treatment facility. During dental treatment, the dental officer and the dental specialist touch a variety of instruments and equipment, as well as the patient's oral cavity. There are standard precautionary procedures routinely taken to reduce the risk of potential cross infection.

1-10. CLEANLINESS IN THE CLINIC

The walls, floors, and furniture of the dental treatment facility collect dust and dirt that harbor disease-causing microorganisms. Thus, the basis of infection control is cleanliness.

1-11. UNIVERSAL PRECAUTIONS

a. **Definition.** Universal precautions may be defined as treating all patients alike since it is impossible to always determine how potentially infectious each patient may be.

b. **Saliva.** Saliva in the dental setting is considered an "other potentially infectious material" (OPIM) and must be treated the same as blood.

c. **Equal Treatment.** All patients are to be treated alike, that is, as potentially infectious. Special restrictive alternatives are not appropriate, such as appointment time restrictions, "high risk" protocols, or special treatment rooms.

1-12. INDIVIDUAL PRECAUTIONS/PROTECTION

The dental specialist should be concerned with the hazard of infection and should take precautions to avoid cross infection, as follows.

a. **Inoculations.** The dental specialist, the dental officer, and the patient should have all inoculations up to date. All military dental health care workers must receive the hepatitis vaccine. It must be offered to all civilian dental health care workers with patient contact.

b. **Surgical Masks.**

(1) Team members must wear disposable surgical masks to protect themselves and the patients from the transmission of respiratory infections. The water spray of the high-speed handpiece, in combination with the patient's saliva, generates a contaminated aerosol mist that can transmit disease.

(2) The mask must be changed between patients and more often if the mask becomes visibly soiled. One hour is considered the maximum effective usage time of one mask.

c. **Protective Glasses.**

(1) The dental specialist, the dental officer, and the patient must wear protective glasses that protect their eyes from hazardous spray or splatter.

(2) Safety glasses (with solid side shields or with chin length face shields) or goggles must be worn by the dental health care worker (DHCW) whenever splashes, spray, or splatter are anticipated.

(3) Protective glasses must always be worn by dental health care workers to deflect fragments of material expelled from the patient's mouth during operation of the high-speed handpiece.

d. **Gloves.** Dental care personnel must wear gloves during cleaning and disinfection procedures and during patient care. While gloves provide a barrier to disease transmission, the most effective barrier is through frequent hand washing. Gloves must be changed between patients and not washed or disinfected.

e. **Gown, Smocks, and Outer Garments.**

(1) Hospital scrubs (with long sleeve outer garment available), washable cloth gowns, smocks, lab coats, and/or disposable gowns are all acceptable for use. Military duty uniforms or civilian "street clothes" (above the waist) are not to be worn as outer garments when exposed to blood or OPIM.

(2) The amount and type of coverage depends upon the dental health care workers anticipation of exposure to blood or OPIM. If the dental health care worker anticipates the need for extended coverage (such as long sleeves) to prevent exposure to skin or underclothes, then protective covering must be worn.

f. **Use of a Mouthwash.** Before dental treatment, the patient should be encouraged to rinse with a suitable mouthwash to provide a short-term reduction of oral bacteria.

1-13. ASEPTIC HANDWASHING TECHNIQUE

All dental health care workers are required to utilize the following aseptic technique before working on a patient.

a. **General.** The three-hand washing technique outlined below is recommended before putting on gloves. The routine use of this technique avoids skin abrasion that makes microbial entry possible when a DHCW is contaminated through defective gloves.

b. **Steps of Procedures for Three Hand Washings.**

(1) Remove all rings.

(2) Wet hands with cool to lukewarm water.

(3) Dispense 3 to 5 ml of soap or antimicrobial surgical hand scrub (4 percent chlorhexidine gluconate) into the right or left cupped hand.

(4) Wash the right or left hand, carefully paying attention to the wrist, the knuckles, and around the fingernails, for 15 seconds.

(5) Repeat steps 1 through 4 for the other hand.

(6) Rinse the hands with cold water, letting water run in the direction of the elbow.

(7) Repeat steps 1 through 6 two more times.

(8) Dry the hands with a disposable or sterile towel (one per hand).

(9) Use the last towel to close the faucet before disposal.

c. **Putting On Gloves.** Glove according to the sterile gloving procedure.

d. **When to Perform the Hand Washing.**

(1) Steps 1 through 9 of paragraph b should be performed by the dental specialist and the dental officer <u>at the beginning of each work day</u>.

(2) After each occurrence of removing gloves throughout the day, hands are to be washed with a <u>simplified</u> 15 to 30 second hand wash with antimicrobial soap.

1-14. STERILE TECHNIQUE

In certain oral and periodontal surgical procedures, large open wounds require a regimen of very strict attention to infection control, called sterile technique. The dental specialist must be aware of the principles of sterile technique and of local guidelines concerning its use.

Continue with Exercises

EXERCISES, LESSON 1

INSTRUCTIONS: Answer the following exercises by marking the lettered response that best answers the exercise or best completes the incomplete statement or by writing the answer in the space provided.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced with the solution.

1. Select the microorganism that requires living tissue cells rather than a laboratory culture media to support growth and reproduction.

   a. Fungi.

   b. Bacteria.

   c. Viruses.

2. Spiral-shaped bacteria are called:

   a. Bacillus.

   b. Spirilla or spirochete.

   c. Coccus.

3. Streptococci refers to round-shaped bacteria arranged in:

   a. Chains.

   b. Pairs.

   c. Clusters.

   d. Palisades.

4. Which of the following are usually large, round, or oval cells and reproduce by budding?

   a. Molds.

   b. Yeasts.

5. What is the typical bacterial count for saliva from the dorsal surface of the tongue?

   a. 75 million per milliliter.

   b. 75 billion per milliliter.

   c. 750 million per milliliter.

6. Which of the following microorganisms are anaerobic and inhabit the gingival sulcus?

   a. Candida albicans.

   b. Lactobacilli.

   c. Facultative streptococci.

   d. Oral spirochetes.

7. Match the disease in Column I to the transmission route for infection in Column II.

COLUMN I	**COLUMN II**
(1) _____ Influenza viruses.	a. Direct personal contact.
(2) _____ Dysentery.	b. Opportunistic microorganisms.
(3) _____ Hepatitis.	c. Through the respiratory tract.
(4) _____ Bacteria causing dental caries and periodontal disease.	d. Through the gastrointestinal tract.

8. When a person manufactures antibodies in response to an antigen, it is known as:

    a. Active immunity.

    b. Passive immunity.

9. Essential vitamins, mentioned in the text as a defense mechanism of the body, are produced by:

    a. White blood cells.

    b. The skin.

    c. The respiratory tract.

    d. The lower colon.

    e. The eye.

10. Which of the following diseases can be transmitted by dental scalers that have come into contact with contaminated blood?

    a. Candidiasis.

    b. Tuberculosis.

    c. Dental caries.

    d. Influenza.

    e. Hepatitis.

11. Which of the following infections may appear and grow when natural resistance is lowered, as in the case of debilitated adult patients?

    a. Hepatitis.

    b. Syphilis.

    c. Candidiasis.

    d. Tuberculosis.

    e. Influenza.

12. The basis of infection control in the dental treatment facility is _____.

13. List individual protective measures taken to avoid cross infection.

    _____.

    _____.

    _____.

    _____.

    _____.

14. Saliva in the dental setting is considered as an " _____ _____

    _____ _____ " (OPIM) and must be treated the same as

    _____.

15. "Universal precautions" means:

    a. Saliva is considered a body fluid.

    b. All DCHW's must take precautions before each dental appointment.

    c. All precautions are always necessary.

    d. All patients are treated alike (potentially infectious).

    e. Only simple precautions are needed for some patients.

16. When DCHW's anticipate exposure to blood or OPIM, which of the following must be worn as outer garments over underclothes?

    a. Hospital scrubs (with long sleeve outer garment available).

    b. Washable cloth gowns.

    c. Smocks or lab coats.

    d. Disposable gowns.

    e. Any of the above.

17. Gloves must be:

    a. Cleaned using sterile gauze on the outside surface.

    b. Changed between patients.

    c. Worn during patient treatment.

    d. "b" and "c" above.

    e. "a," "b," and "c" above.

18. In the three-hand washing technique, how many seconds (in total) is each hand washed with antimicrobial surgical hand scrub or soap?

    a. 30 seconds.

    b. 36 seconds.

    c. 45 seconds.

    d. 60 seconds.

19. Write in the space provided the correct sequence for the three-hand washing technique required of all dental health care workers. Use numbers 1, 2, 3, and so forth.

    ____ Wash one hand, then the other hand.

    ____ Rinse the hands with cold water.

    ____ Dry the hands with a disposable towel.

    ____ Dispense 3 to 5 ml. of soap into the cupped hand.

    ____ Wet hands with cool to lukewarm water.

    ____ Remove all rings.

    ____ Use the last towel to close the faucet.

20. After each occurrence of removing gloves throughout the day, the hands are to be washed with a _____ 15 to 30 second hand wash with _____ soap.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES: LESSON 1

1. c (para 1-1)

2. b (para 1-2; figure 1-1)

3. a (para 1-2; figure 1-2)

4. b (para 1-3)

5. c (para 1-5)

6. d (para 1-5)

7. (1) c
   (2) d
   (3) a
   (4) b (para 1-6)

8. a (para 1-7c)

9. d (para 1-7d)

10. e (para 1-8a)

11. c (para 1-8f)

12. cleanliness (para 1-10)

13. Inoculations.
    Surgical masks.
    Protective glasses.
    Gloves.
    Gowns, smocks, or outer garments. (para 1-12)

14. "other potentially infectious material"; blood (para 1-11b)

15. d (para 1-11c)

16. e (para 1-12e)

17. d (para 1-12d)

18. c (para 1-13b(4))

19. 4
5
6
3
2
1
7 (para 1-13b)

20. simplified; antimicrobial (para 1-13d(2))

End of Lesson 1

LESSON ASSIGNMENT

LESSON 2 Sterilization and Disinfection.

TEXT ASSIGNMENT Paragraph 2-1 through 2-22.

LESSON OBJECTIVES After completing this lesson, you should be able to:

2-1. Identify the difference between sterilization and disinfection, to include guidelines for classifying dental items.

2-2. Identify various modes of heat sterilization and the use of each mode.

2-3. Identify how an autoclave works, to include guidelines for cleaning the steam sterilizer.

2-4. Identify guidelines for cleaning and inspecting instruments prior to sterilization.

2-5. Identify packaging materials and the expected shelf life of sterilized packages.

2-6. Identify bacteriological spore testing and how to interpret results.

2-7. Identify procedures for preparing, loading, and operating the steam sterilizer.

2-8. Identify procedures for storing and handling sterile items.

2-9. Identify procedures for disposal of regulated waste.

2-10. Identify chemical agents recommended and not recommended for disinfection.

2-11. Identify disinfection procedures for fixed and semi-fixed equipment

SUGGESTION After completing the assignment, complete the exercises at the end of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 2

STERILIZATION AND DISINFECTION

Section I. STERILIZATION, STORAGE, AND DISPOSAL

2-1. General

a. **Overview.** Sterilization destroys all forms of life within an environment. Disinfection destroys or inhibits most pathogenic organisms. Proper cleaning of items to be sterilized and disinfected is necessary to prevent cross-infection. Steam, chemical vapor, or dry heat under specific conditions of time, temperature, and pressure provide the easiest, quickest, and most common means of sterilization in the dental clinic. Chemical disinfectants provide the most efficient means of disinfection.

b. **Definition of Terms.**

(1) Disinfection. Surface disinfectants are applied to operatory surfaces and equipment that cannot be removed and immersed and heated, but that have been touched by patients or dental staff or have been exposed to aerosol or splatter produced by high speed dental equipment such as handpieces. Such terms as "antiseptic," "germicide," and "sanitizer" fall into the category of disinfection. Even though most infectious material is destroyed by disinfection, some resistant, potentially harmful microorganisms may remain.

(2) Sterilization. Sterilization procedures are applied in dentistry to reduce the possibility of cross contamination by killing all bacteria, bacterial spores, and viruses found on instruments, materials, and equipment that has been exposed to a patient's body fluids and/or tissues. This is achieved through the correct utilization of sterilization methods.

NOTE: As a field expedient method, boiling water may be used for sterilization; however, boiling water requires 30 minutes to kill all spore-forming microorganisms.

2-2. CLASSIFICATION OF DENTAL ITEMS

a. **General.** Dental items are classified according to the need and practicality for achieving disinfection or sterility. Generally speaking, any instrument which may penetrate tissue or bone must be sterilized. The dental specialist should have a clear understanding of this classification to ensure proper handling.

b. **Critical Disposable Items.** Critical disposable items, such as scalpel blades and injection needles, are introduced beneath the oral mucosa and carry the greatest risk of infection. These items require sterility before use and special procedures for disposal after use.

c. **Critical Nondisposable Items.** Critical nondisposable items, such as surgical instruments, are able to penetrate tissue or bone and must be sterilized. Another example is an endodontic file.

d. **Noncritical Items.** Noncritical items, such as lamp handles and cabinet tops, that do not come in direct contact with the patient are wrapped with plastic wrap or aluminum foil and changed after each patient. Items touched by hands during treatment require careful attention and disinfection before treating each new patient.

2-3. HEAT STERILIZATION

Heat is the most practical and dependable method of achieving sterility. This method of sterilization should be used in preference to room temperature chemical means. Dry heat is effective for sterilization but usually takes longer. Burs and endodontic instruments are sterilized using dry heat or chemical vapor under pressure. See figure 2-1. Glass bead heat transfer is used at chairside to sterilize the files and the small instruments used in endodontic treatment, but only for one patient at a time and not for use on other patients.

METHODS	TEMPERATURE	TIME	PRESSURE	DISADVANTAGES
Autoclave	121ºC (250ºF) 132ºC (270ºF)	30 minutes 7 minutes	15 psi 30 psi	Rusts and/or corrodes instruments
Chemical Vapor	132ºC (270ºF)	20 minutes	20 psi	Formaldehyde fumes
Dry Heat	160ºC (320ºF) 171ºC (340ºF)	2 hours 1 hour	NONE	Increased time for penetration

Figure 2-1. Comparison of various modes of heat sterilization.

2-4. STERILIZATION BY THE AUTOCLAVE (MOIST HEAT)

a. **General.** The autoclave (pressure steam sterilizer) sterilizes using steam (moist heat) from distilled water. All packs must be loosely arranged in the trays to ensure penetration by the steam to the center of the pack. All hinged instruments, such as scissors and pliers, should be placed with the joints open. Instruments of stainless steel or carbon steel, plastic instruments, and hard rubber or nylon products can be sterilized in an autoclave, but steam will rust endodontic instruments or burs.

b. **Standard Process.** All items must be exposed to enough steam under pressure to destroy all microorganisms. The autoclave is heated to 250°F (121°C) and set at a pressure of 15 pounds per square inch for 30 minutes. [Since water boils at 212°F (100°C) the required temperature can only be attained by raising the pressure. Thus, 250°F creates a pressure that, at sea level, is equal to 15 pounds per square inch.] Temperature is thermostatically controlled on autoclaves. Steam has a very high heat of condensation, and that is why steam can cause so much damage to organic matter. As steam condenses on a cool instrument in the autoclave, it releases a large amount of heat energy that destroys microorganisms by denaturation of proteins and results in sterilization. The actual sterilization time of 30 minutes allows ample time for the steam to enter the packaging material, which may be paper, plastic, or muslin cloth.

c. **Cleaning the Steam Sterilizer (Autoclave).** The dental instrument sterilizer must be cleaned so that all residue and mineral deposits are removed. In addition, the door hinges should be lightly oiled, as needed, and the power cord and the chamber door gasket visually checked.

(1) Routine maintenance. Routine maintenance includes cleaning the exterior surfaces with the mildest of cleaning solutions, rinsing the interior surfaces thoroughly with fresh water, wiping the surfaces dry to avoid water marks, draining the water from the chamber, removing the strainer and wiping it to remove sediment deposits, washing the chamber and trays with a mild detergent solution and cloth, rinsing the detergent residue away from the chamber and trays with fresh water and wiping dry with a lint-free cloth, and replacing the strainer.

(2) Removing visible mineral deposits. To remove visible mineral deposits, a cleaning solution recommended by the manufacturer's instructions is to be used. The water is drained from the chamber and reservoir. The solution is then poured into the reservoir and the chamber is allowed to fill until the solution covers the deposits. When the deposits loosen, they are wiped away. After that, the cleaning solution is drained from the chamber and reservoir and the chemical residue is removed by flushing with distilled water and wiping dry.

2-5. THE ULTRASONIC CLEANING UNIT

a. **Cleaning by Cavitation.** The ultrasonic cleaning unit is used in preparing and cleaning instruments for sterilization. The unit uses high frequency sound waves to create cavitation. Cavitation is a process of continuous formation and implosion of microscopic bubbles in a cleaning solution. This creates a gentle scrubbing action that penetrates all exposed surfaces, leaving them free of all foreign matter. The ultrasonic cleaning unit does not sterilize an item; it only cleans the item. Rinsing and drying still must be done before sterilization.

b. **Characteristics.** Cleaning solutions available for the ultrasonic cleaner are harmless, chemically stable, and usable several times. Only ultrasonic cleaner solutions are effective in an ultrasonic unit; other solutions may not be substituted. Normally, an article should remain in the cleaner for 10 to 15 minutes.

2-6. PREPARING INSTRUMENTS FOR STERILIZATION

a. **General.** Before packaging instruments for sterilization, four steps must be taken. Remember that all hinged instruments remain open during the cleansing procedure.

b. **Four Steps.**

(1) Soak instruments in a holding solution prior to using the ultrasonic cleaner unit. The holding solution should be prepared first thing in the morning and replaced with fresh solution after the morning patient session.

(2) Clean the instruments ultrasonically. Prior to using the ultrasonic cleaner unit if visible debris is present, scrub the instruments under warm running water to remove all scale, debris, blood, saliva, and tissue. Items are to be placed in the ultrasonic cleaner rather than dropped. This prevents splashing and possible injuries to the operator.

(3) Rinse the instruments under warm running water.

(4) Pat the instruments dry to remove excess water.

2-7. INSPECTING ITEMS FOR STERILIZATION

a. **General.** All items must be inspected after they have been cleaned, dried, tested for function, and sorted. If they are soiled, the process of preparation must be repeated. It is recommended that local policy be followed regarding lubrication, sharpening, repairing, and replacement and for disposal of unserviceable items.

b. **Inspection Factors.**

(1) Metal items. Inspect for signs of rust, cracks, chips, and bent or missing pieces.

(2) Hinged instruments. Open all hinged instruments during cleaning and sterilization. Inspect instruments for sharpness and for proper closure. Oil the instrument, if necessary. If dull, sharpen the instrument.

(3) Linens. Inspect linens for tears, holes, stains, or other defects.

2-8. PACKAGING INSTRUMENTS FOR STERILIZATION

a. **General.** Dental instruments are packaged individually in sets or in packs, depending upon the intended use. All packages should be wrapped loosely to allow the sterilizing agent to circulate freely throughout the pack. It is important to make sure that scissors, hemostats, and other hinged instruments are in the open position. The extra length of the package allows inside air to expand. The size of the individual pack will generally determine the best packaging material. The most common materials are paper, plastic, nylon, and cloth.

(1) Paper. Instruments can be packaged in paper envelopes. When tape is used for sealing, its length should be 2 1/2 times longer than the width of the tubing or the paper envelope. This allows the tape to be sealed upon itself after the tube or paper envelope is folded.

(2) Plastic or nylon. When plastic or nylon sterilization tubing is used to package instruments, the pack (after sealing) should be 20 percent longer than the longest instrument. The extra length allows inside air to expand and ensures that a single heat seal will hold.

(3) Cloth. When cloth is used as a packaging material, use a double thickness.

b. **Labeling Packages with a Shelf Life Expiration Date.** When the sterilization and disinfection cycles are complete, label the packages with a shelf-life expiration date. This date should correspond to the shelf life listed in figure 2-2. The packages must be stored in a clean area. When packs are opened, they should be opened using an aseptic technique.

WRAPPER	SHELF LIFE
Autoclave paper bags, muslin, and wovens	72 hours
Nonwovens, nylon, plastic, or plastic and paper laminate when heat sealed	6 months

Figure 2-2. Expected shelf life of instruments wrapped in different materials.

2-9. HEAT-SENSITIVE ADHESIVE TAPE TEST

Heat sensitive indicator tape [chemical indicator (CI) tape] serves as a binder to seal wrappings or packs. The tape has been treated so that portions of its surface change color when subjected to certain temperatures. It only serves as an indicator that the critical temperature was reached, but does not prove that the necessary time was maintained for sterility. It is not an indicator of sterility.

2-10. FUNCTIONAL TESTING OF THE STERILIZER

Routine testing of the sterilizer is necessary to ensure proper functioning. Sterilizers must be tested with bacteriological spore tests at least once a week.

2-11. BACTERIOLOGICAL SPORE TESTING

a. **General.** Spores are used to set the standard for testing the efficiency of sterilizers because spores are the most difficult form of bacteria to destroy.

b. **Two Types of Testing.** There are two systems used for bacteriological spore testing. One uses spore strips and the other uses spore vials.

(1) Outside medical laboratory. Some dental facilities send bacteriological spore strips from the sterilizers to a microbiology laboratory for culture tests.

(2) Facility incubator. Other dental facilities have a self-contained incubator for testing spore vials. The vial system is more popular because it eliminates the necessity of an outside laboratory with their transportation costs, communication problems, and increased risk of false positives.

c. **Procedure for Testing.** The manufacturer's instructions must be followed for each of the spore test brands. Each type uses the concept of a control strip or control vial that is activated but not sterilized in order to prove that the test batch is still usable. The tests must be performed weekly and the results must be kept on file for one year.

d. **Interpreting Spore Testing Results.** A spore strip or vial that tests positive after running in a sterilizer for the full cycle indicates bacteriological growth and is evidence that the sterilizer did not kill the spores. The results warrant the following actions.

(1) Check the control strip or vial. It should also be positive.

(2) Suspend use of the sterilizer.

(3) Check the expiration date of the test batch.

(4) Recall and resterilize (in a different sterilizer) all items sterilized after the last negative laboratory test (one week before) using the load control number (LCN).

(5) Perform the spore test again.

(6) If the second test is positive (including the control), call the medical maintenance office for repair of the sterilizer.

(7) If the second test is negative (and if the control is positive), assume that the first test was accidentally contaminated during culturing. The sterilizer is functioning properly and may be placed back in operation.

2-12. STERILIZING DENTAL ITEMS

a. **Preparing the Sterilizer for Use.** First, the sterilizer power cord is plugged into a power source. Then, the water reservoir is filled with distilled water until the water level reaches the FULL indicator. The reservoir cover is put back on. Next, the chamber is filled with water from the reservoir by rotating the power switch to FILL. The water must be level with the indicator mark and the process is verified visually. (Note that the heating element is located in the chamber of the autoclave. The autoclave must be level so that the heating element is covered with water.) When the chamber is properly filled, the power switch is turned to OFF.

b. **Loading the Sterilizer Trays.** The packages are placed on the trays. The packages are placed on their sides to prevent cross-contamination of the instruments. The packages are never stacked one on the other. Packages are arranged loosely to allow steam to circulate between packages. Nonporous items and thinner items are placed in the topmost tray. The thickest, most dense packages are placed in the bottom tray. When the trays are loaded, the trays are placed in the autoclave chamber. When testing of the sterilizer is done, the sterilization monitors (e.g. spore vials) are inserted in the center of the thickest packages to be sterilized.

c. **Operating the Sterilizer.** The sterilizer door is closed and secured. The sterilizer is preheated by turning the power control knob to STERILIZE. The timer is set for 15 minutes. As soon as the temperature is at the required temperature (250ºF) and pressure (15 psi), the sterilization cycle can begin. The timer is reset for 30 minutes and the sterilizer is allowed to complete the cycle. When it has finished, the autoclave is vented (if required), the chamber door is opened, and the contents are allowed to dry. Be careful to stand to the side when opening the door because of steam release and be careful not to touch the metal part of the sterilizer. Then, the load information is logged into the sterilizer logbook.

2-13. STORAGE AND SHELF LIFE OF STERILE ITEMS

a. **Safe Storage.** Proper sterilization and disinfection techniques are of little value unless proper attention is directed to the safe storage of sterile items. Sterile packs should be visually inspected prior to use. Packs stored beyond their expiration date or suspected of being contaminated must be rewrapped and sterilized. The manufacturer's instructions should be strictly followed when storing commercially prepared presterilized items. Cabinets used to store sterile packs must be cleaned and disinfected monthly. The cleaning and disinfecting must be documented using a log.

b. **Load Control Number (LCN).** The LCN consists of seven digits. The first two digits designate the assigned number of each sterilizer. A clinic may have five or six sterilizers, and the LCN tells which sterilizer was used. The third, fourth, and fifth digits designate the Julian calendar day (For example, 365 is December 31st [assuming it is not a leap year] and 006 is January 6th). The sixth and seventh digits designate the number of times a sterilizer is used in a 24-hour period. If the spore test is positive on a particular sterilizer, the LCN will enable the user to recall only those items that are identified by the first two digits. Thus, this system enables personnel to establish control over instruments "sterilized" in a malfunctioning sterilizer. It is required also that all packages be marked visibly with an expiration date using the day/month/year format.

c. **The Sterilizer Logbook.** A sterilizer logbook must be maintained. The dental specialist must enter the load information, to include the sterilizer number, the date, the LCN, the expiration date, the contents of the load, the signature of the operator (written at the time of load), and the results of spore testing.

d. **Inventory Control.** Sterilized items have a shelf life determined by the type of wrapping used (see figure 2-2), the storage conditions, the conditions during transport, and the amount of handling. For inventory control, the day on which items are sterilized is considered the first day of the shelf life if they are stored in a dust-free area. All sterilized items must be labeled with the LCN and the expiration date. If packages are found with expired dates, the packages must be repackaged and resterilized.

e. **Shelf Life.** Sterilized items have a shelf life determined by the type of wrapping used (See figure 2-2). The day on which items are sterilized is considered the first day of the shelf life if they are stored in a dust-free area. All sterilized items must be labeled with the LCN and the expiration date.

2-14. HANDLING PROCEDURES FOR STERILE ITEMS

a. **General.** The proper handling of sterile items will prevent injury and cross infection. The dental specialist should follow recommended guidelines when using sterile items.

b. **Guidelines.** Standard guidelines follow.

(1) Mask and sterile gloves. All instruments from the sterilization or disinfection cycle must be handled with mask and sterile gloves. Surgery and certain specialized procedures require the use of sterile gloves and mask.

(2) Disposal of needles and needle injury. Use only sterilized syringes and commercially presterilized disposable needles for injections. Dispose of used needles after each appointment in the sharps container. Any injury suffered by the dental specialist or dental officer from a contaminated needle or instrument has the potential of introducing serious disease (see Lesson 1). Such an injury should receive prompt medical evaluation because one cannot always know if the patient's medical history includes an infectious disease, such as hepatitis. Each Dental Activity has a post-exposure protocol in the standing operating procedures (SOP) that describes what steps are to be taken after such an injury or exposure.

(3) Individual dosage. Use individual-dose anesthetic cartridges. Discard those that are partially used. Place all used cartridges in the sharps container.

(4) Recapping needles. The dental officer may use a recapping device to replace the cover himself, or he may slide the needle into the cap that has been placed on the bracket table using a one-hand technique. Uncovered, used needles/syringes should never be passed between the dental officer and the assistant.

(5) Disposable items. Use disposable saliva ejector/aspirator tips, mouth props, and other such items when possible to minimize cross-infection and to reduce the sterilization workload.

(6) Designated "sharps" receptacle. Discard disposable needles, suture needles, and scalpel blades into the same designated sharp item ("sharps") receptacle. Dispose of regulated waste according to local procedures.

2-15. DISPOSAL OF WASTES

a. **Definitions.** Regulated waste is defined by the Occupational Safety and Health Administration (OSHA) as items that can release a drop of blood or OPIM when compressed or items that are so heavily caked with dried blood or OPIM that the waste may flake off. The OSHA term "regulated waste" (RW) is used for what was formerly referred to as "infectious," "septic," or "medical" waste.

b. **Regulations.** The dental specialist should become familiar with local procedures concerning the disposal of contaminated materials. Each state has its own regulations concerning the handling and treatment of contaminated and regulated wastes. OSHA or local/state regulations apply, whichever is more stringent.

c. **Containers.**

(1) Sharp waste. Sharp disposable items, such as needles or blades, are placed in rigid, impenetrable plastic bags or containers colored red in which sharp items cannot break through. The container is labeled with words such as "Sharps."

(2) Other waste. Other disposable items (such as saliva ejectors, aspirator tips, mouth props, rubber dams, gloves, and masks) may be disposed of in general waste.

(3) Cautions. Containers must be closed when moved and placed in a second container if leakage is a possibility.

d. **Placement of Containers.** Regulated waste containers with red bags or biohazard labels (meaning biological hazard) must be situated in each operatory/work area. In open bay clinics, one per bay is sufficient. In isolated operatories, one per operatory is required.

Section II. DISINFECTION

2-16. STERILIZATION AND DISINFECTION OF DENTAL TREATMENT ROOM EQUIPMENT

The design, size, and construction of some dental equipment complicate disinfection and sterilization. Although it would be ideal for all instruments and equipment to be sterilized, this is impossible. The dental specialist should have a clear understanding of effective agents and techniques used to disinfect items that cannot be heat sterilized. At one time, immersion "cold sterilization" with chemicals was widely used in dentistry. Today, DENTACs rarely use chemical sterilants as an alternative for the preferred heat sterilization.

2-17. WATER LINES

Organisms growing in the dental unit water lines can be a source of cross contamination between patients. To reduce this possibility, flush water through the drinking water dispenser, air/water syringe, and high-speed handpiece for 3 to 5 minutes at the beginning of each day. In addition, flush the water lines for at least 15 seconds between patients.

2-18. USE OF CHEMICAL AGENTS FOR DISINFECTION

Dental operatory equipment and surroundings are frequently exposed to spray, splatter, and contaminated gloves during patient treatment. It is impossible to sterilize these areas, but chemical disinfection is a practical alternative. Room temperature chemical agents can be used to disinfect certain items when sterilization is not recommended (such as with safety glasses). Anything that can be sterilized should be sterilized. Disinfection is impossible to verify; therefore, it is extremely important to be thorough. There is no perfect or ideal disinfectant at this time. Disinfection is effective for its limited purpose, but is not a substitute for sterilization.

2-19. CHEMICAL AGENTS NOT RECOMMENDED FOR STERILIZATION

a. **General.** There are several chemical agents used in the past for sterilization that are not currently recommended for use by the Center for Disease Control (CDC), the American Dental Association (ADA), or U.S. Army TB MED 266. For a summary, see figure 2-3.

CHEMICAL CLASSIFICATION	DISINFECTANT	STERILANT	DISADVANTAGES
Iodophors (1% iodine)	1:213 dilution 10 minutes 20ºC (68ºF)	No. May be used as a cleanser.	May discolor items if mixed incorrectly.
Glutaraldehydes	Some must be diluted; some used at full strength. Reuse if possible.	No.	Not a cleanser; corrosive to instruments; caustic to skin; immersion use only.
Chlorine			
1. Chlorine dioxide	Varies	6 hours	Corrosive;strong odor
2. Sodium hyperchlorite	1:10 dilution	No	Corrosive;strong odor
Phenols: Complex or Synthetic	Varies	No	May damage plastics; irritates skin/eyes.
Alcohol			
1. Isopropyl	No	No	To be used as cleanser only.
2. Ethyl	No	No	
Quaternary Ammonium Compounds	No	No	Not effective. Not for dental use.
Note: Use gloves when handling all disinfectants.			

Figure 2-3. Chemical agents.

b. **Alcohols.** Neither ethyl alcohol nor isopropyl alcohol is sporicidal. They evaporate too quickly for 10-minute coverage, corrode rubber and plastic, and diminish in effectiveness when exposed to saliva and blood. Alcohols currently have no practical use in dentistry except as cleansers.

c. **Quaternary Ammonium Compounds.** Quaternary ammonium compounds are inactivated by organic matter, are not sporicidal or tuberculocidal, and do not inactivate hepatitis viruses or gram-negative microbes. Currently, none are accepted for dental use.

d. **Phenols.** Simple phenols are not effective for disinfection because they are not bactericidal or sporicidal.

2-20. CHEMICAL AGENTS COMMONLY USED FOR DISINFECTION

a. **General.** The chemical agents described below are recommended for use as chemical disinfectants. For a summary of the information presented below, see figure 2-3.

b. **Iodophors.** Iodine compounds usually combine iodine (1 percent) with a surface-active agent (detergent). They are widely used for surface disinfection. Iodophors are not caustic to body tissues; however, rare instances of local sensitivity (allergy) may occur. Dilution and contact time are critical. They are less corrosive than most disinfectants, but may discolor some surfaces.

c. **Glutaraldehyde.** Glutaraldehyde is the only chemical that kills spores and can be used for chemical sterilizing from a practical viewpoint. (Others that kill spores are too corrosive.) Sterility (unmonitored) is attained after immersion in full strength glutaraldehyde for 10 hours. Glutaraldehyde solution is particularly useful for the chemical disinfection of rubber and plastic items or items with adhesive bonded parts, such as certain mirrors that cannot be heated. Several types of glutaraldehyde solutions are available for use in the dental clinic and each must be mixed according to manufacturer's instructions. The solutions are active only for a limited time and storage temperature must be controlled at 80ºF (26ºC) or below. When glutaraldehyde is used for disinfection, the item being disinfected is immersed in the solution. Since the solution is irritating to the skin, objects being disinfected should be rinsed with 80 to 90 percent alcohol or sterile water before use. Glutaraldehyde should not be used as a surface disinfectant because of the toxic effects of the fumes.

d. **Chlorine Compounds.** Chlorine solutions must be replaced on a daily basis.

(1) Sodium hypochlorite. Sodium hypochlorite solution is a disinfectant with a concentration of 0.5 to 5 percent of chlorine that can be used to disinfect plastic items. It is corrosive to instruments and can harm skin, eyes, and clothing. While it can be used for sterilizing or disinfection, sodium hypochlorite is too corrosive to be practical.

(2) Chlorine dioxide. Chlorine dioxide is effective for surface disinfection and is commonly used. Recent improvements in regard to odor and corrosiveness may make it even more popular and useful in the future.

e. **Complex or Synthetic Phenols.** Complex or synthetic phenols contain more than one phenolic agent. These phenolic agents act synergistically for their antimicrobial action. The advantages are that they have a clear color, have a pleasant odor, and are less corrosive on metal. The disadvantages are that they can degrade certain plastics and that the fumes irritate skin and eyes.

2-21. CLEANING PERFORMED PRIOR TO CHEMICAL DISINFECTION

Both surfaces and instruments must be cleaned prior to disinfection. Disinfectants are affected by saliva and blood. Room temperature chemical disinfectants will not penetrate organic matter (which may contain disease organisms) that is retained on instruments and equipment. Surfaces must be cleaned and wiped before being sprayed with the chemical disinfectant. Instruments and equipment should be placed in an ultrasonic cleanser unit, rinsed, and dried prior to immersion in a chemical disinfectant. Scrubbing under running water is necessary only if visible debris is present after use of the ultrasonic cleanser unit.

2-22. FIXED AND SEMI-FIXED EQUIPMENT

a. **Fixed Equipment.** This equipment should be disinfected IAW local SOP or barrier protected with plastic wrap or aluminum foil. See figure 2-4.

b. **Semi-fixed Equipment.** See figure 2-4.

(1) Handpieces.

(a) Handpieces must be sterilized.

(b) Handpieces must receive pre-sterilization and post-sterilization maintenance according to the manufacturer's instructions.

(2) Three-way syringe tips and aspirator tips. Saliva and debris can be retracted into the three-way syringe tips and possibly contaminate other patients unless the tips are removed and sterilized after each patient. Aspirator tips must be sterilized or be disposable.

c. **Guidelines for Both Fixed and Semi-fixed Equipment.** The dental specialist should wipe down (clean) all dental equipment prior to disinfection. Surfaces that may be contaminated by blood or saliva and are difficult or impossible to disinfect should be wrapped with aluminum foil or plastic wrap. These coverings need to be removed and replaced after each patient. Disinfection must be accomplished between patients and at the beginning and end of each day.

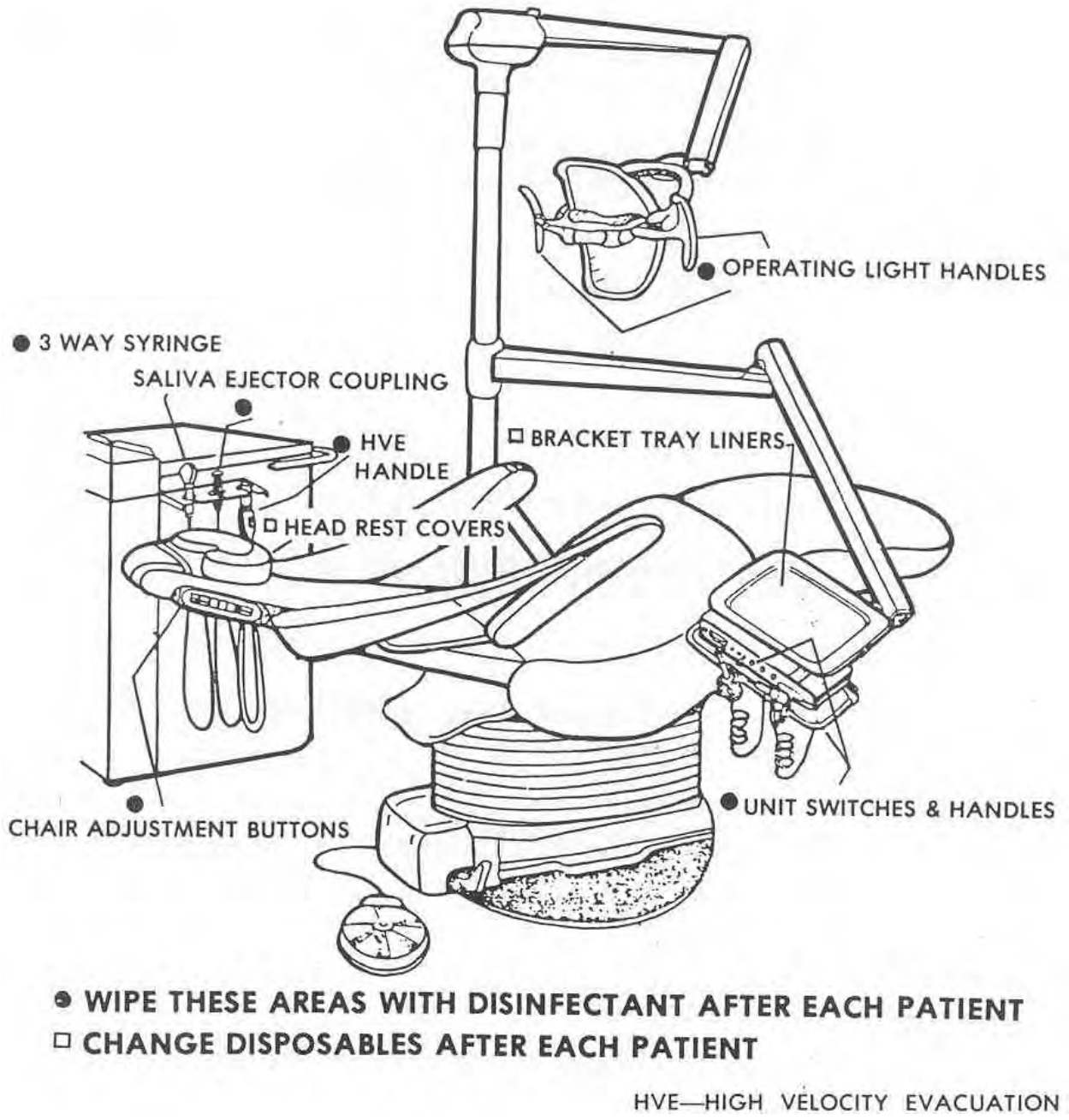


Figure 2-4. Disinfection of fixed and semi-fixed items.

Continue with Exercises

EXERCISES, LESSON 2

INSTRUCTIONS: Answer the following exercises by marking the lettered response that best answers the exercise, by completing the incomplete statement, or by writing the answer in the space provided at the end of the exercise.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced with the solution.

1. _____destroys or inhibits most pathogenic organisms.

   a. Sterilization.

   b. Disinfection.

2. The field expedient method used for sterilization is _____

   instruments, materials, and equipment in water for _____ minutes.

3. For the following list of dental items, place in the space provided the proper classification, as indicated below.

   CD = critical disposable item
   CN = critical nondisposable item
   N = noncritical item

   ____ a. Lamp handles.

   ____ b. Scalpel blades.

   ____ c. Rubber dam clamps.

   ____ d. Injection needles.

   ____ e. Cabinet tops.

   ____ f. Dental forceps.

4. Match the temperature and time requirement in Column I to the method of heat sterilization in Column II.

	COLUMN I Temperature Time		**COLUMN II** Method of heat sterilization
(1) ____	320ºF 2hours	a.	Autoclave (slower time)
(2) ____	340ºF 1hours	b.	Autoclave (faster time)
(3) ____	250ºF 30 min/15 psi	c.	Chemical vapor
(4) ____	270ºF 20 min/20 psi	d.	Dry heat (slower time)
(5) ____	270ºF 7 min/30 psi	e.	Dry heat (faster time)

5. Which method of heat sterilization takes longer?

   a. Autoclave.

   b. Chemical vapor.

   c. Dry heat.

6. Which method of heat sterilization is more likely to cause rust and corrosion of instruments?

   a. Autoclave.

   b. Chemical vapor.

   c. Dry heat.

7. Which method of heat sterilization requires a temperature of 270ºF maintained for 7 minutes at 30 psi?

   a. Dry heat.

   b. Autoclave.

   c. Chemical vapor.

8. Complete statements related to sterilization by the autoclave.
    a. The autoclave sterilizes using steam from _____.
    b. All packs must be _____ arranged.
    c. Endodontic instruments and burs will _____ when exposed to steam.

9. Complete statements related to the ultrasonic cleaning unit.
    a. _____ is a process of continuous formation and implosion of microscopic bubbles in a cleaning solution.
    b. The ultrasonic cleaning unit only cleans an item. It does not _____ an item.
    c. Normally, an article should remain in the cleaner _____ to _____ minutes.

10. Complete information related to preparing instruments for sterilization.
    a. _____the instruments in a holding solution prior to using the ultrasonic cleaner unit.
    b. _____the instruments ultrasonically.
    c. _____the instruments under hot running water.
    d. _____the instruments _____.

11. During cleaning and sterilization, all hinged instruments must be:
    a. Wet.
    b. Closed.
    c. Open.
    d. Scrubbed.

12. Hinged instruments are inspected before sterilization for:

    a. Stains.

    b. Sharpness.

    c. Proper closure.

    d. Cracks and chips.

    e. "b" and "c."

    f. "a" and "d."

13. What is the shelf life of (sterilized) packaged instruments wrapped in double thickness muslin?

    a. 6 months.

    b. 30 days.

    c. 7 days.

    d. 5 days.

    e. 3 days.

14. Six months is the expected shelf life of dental instruments wrapped in:

    a. Nonwoven materials, nylon, plastic, or plastic and paper laminate when heat sealed.

    b. Autoclave paper bags, muslin, and woven materials.

15. When instruments are packaged in paper envelopes, the tape used for sealing should be _____longer than the width of the paper envelope.

    a. 2 1/2 times.

    b. 1 l/2 times.

    c. 50 percent.

    d. 100 percent.

16. When plastic or nylon sterilization tubing is used to package instruments, the pack (after sealing) should be _____ longer than the longest instrument.

    a. 67 percent.

    b. 50 percent.

    c. 33 percent.

    d. 20 percent.

17. Bacteriological spore testing of the sterilizer is required to be done:

    a. Monthly.

    b. Weekly.

    c. Twice a week.

18. The test results of routine testing of the sterilizer must be kept on file for:

    a. 6 months.

    b. 12 months.

    c. 18 months.

19. When heat-sensitive adhesive tape on a pack in a sterilizer changes color, this indicates that:

    a. The critical temperature was reached.

    b. The necessary time was maintained for sterility.

20. Where are spore strips sent for culture tests?

    a. In-house laboratory.

    b. Outside laboratory.

21. A self-contained incubator at a dental facility is used to test:

    a. Spore vials.

    b. Spore strips.

22. When are you required to call the medical maintenance office for repair of the sterilizer?

    a. Second test positive; control negative.

    b. Use of sterilizer suspended; items recalled.

    c. Second test positive; control positive.

    d. Expiration date of the test batch has passed.

23. Match the storage item in Column I to the action recommended in Column II.

	COLUMN I: Storage Item	COLUMN II: Recommended Action
(1) ____	Sterile packs.	a. Rewrap and resterilize.
(2) ____	Packs stored beyond their expiration date.	b. Follow manufacturer's instructions.
(3) ____	Commercially prepared presterilized items.	c. Inspect visually.

24. The LCN is 0204503. What is the assigned number of the sterilizer and how many times has it been used that day?

    a. No. 3; Used 2 times.

    b. No. 2; Used 3 times.

25. Complete statements related to storage of sterile items.

    a. A _____of sterilized items must be maintained.

    b. Sterilized items must be stored in a _____area.

    c. All sterilized items must be labeled with both the _____ and the _____.

26. All instruments from the sterilization or disinfection cycle must be handled with (more than one response may be chosen):

    a. Rubber household gloves.

    b. Mask.

    c. Sterile gloves.

    d. Heat-sensitive adhesive tape.

27. Used uncovered needles/syringes can be passed back and forth between the dental officer and the assistant.

    a. True.

    b. False.

28. Are disposable saliva ejector/aspirator tips and disposable needles or suture needle and scalpel blades discarded into the same receptacle?

    a. Yes.

    b. No.

29. Complete information related to the disposal of wastes.

    a. Regulated waste is defined by OSHA (in part) as items that can release a drop of _____or _____ when compressed.

    b. Regulated waste containers with _____ bags or labels must be situated in each operatory/work area.

    c. If _____ is a possibility, the containers must be closed when moved and placed in a _____container.

30. Complete statements related to guidance concerning possible cross-contamination in water lines.

    a. At the beginning of each working day, the dental specialist should flush water through the drinking water dispenser, air/water syringe, and high-speed handpiece for _____ minutes.

    b. Flush the water lines for at least _____ seconds between patients.

31. List two chemical agents not currently recommended for disinfection.

    a. _____.

    b. _____.

32. List four chemical agents commonly used for disinfection.

    a. _____.

    b. _____.

    c. _____.

    d. _____.

33. Should surfaces be cleaned and wiped before being sprayed with a chemical disinfectant?

    a. Yes.

    b. No.

34. Should instruments and equipment be placed in an ultrasonic cleanser unit, rinsed, and dried prior to sterilization?

    a. Yes.

    b. No.

35. Select the chemical agent that must not be stored where the temperature may rise above 80ºF and that is not used as a surface disinfectant because of the toxic effects of the fumes.

    a. Chlorine.

    b. Quaternary ammonium compounds.

    c. Iodophors.

    d. Glutaraldehyde.

    e. Complex or synthetic phenols.

36. What percentage of iodine is combined with a surface-active agent (detergent) to form the iodophor?

    a. 1 percent.

    b. 5 percent.

    c. 10 percent.

    d. 20 percent.

37. Which chemical disinfectant can be used for sterilizing if the item is immersed for a minimum of 10 hours?

    a. Chlorine dioxide.

    b. Complex or synthetic phenols.

    c. Glutaraldehyde.

    d. Iodophors.

38. Which of the following is/are commonly used for surface disinfection? (More than one response may be correct.)

    a. Isopropyl alcohol.

    b. Sodium hypochlorite.

    c. Glutaraldehyde.

    d. Chlorine dioxide.

    e. Iodophors.

39. Which of the following chemical agents is neither sporicidal nor tuberculocidal and are not accepted for dental use/

    a. Glutaraldehyde.

    b. Isopropyl alcohol.

    c. Sodium hypochlorite.

    d. Quaternary ammonium compounds.

    e. Iodophors.

40. What is the dilution ratio for sodium hypochlorite?

    a. 1:10.

    b. 1:20.

    c. 1:32.

    d. 1:213.

    e. 4:1.

41. According to the text, which chemical disinfectant must be replaced on a daily basis?

    a. Iodophors.

    b. Glutaraldehydes.

    c. Chlorine.

    d. Phenols.

42. Of the following chemical disinfectants, which one is NOT caustic to body tissues?

    a. Phenols.

    b. Iodophors.

    c. Glutaraldehydes.

    d. Chlorine.

43. Of the chemical agents commonly used for disinfection, which one has a clear color, has a pleasant odor, and is less corrosive on metal?

    a. Iodophors.

    b. Glutaraldehyde.

    c. Alcohols.

    d. Chlorine dioxide.

    e. Complex or synthetic phenols.

44. Select the disposable items that must be changed after each patient. (More than one response may correct.)

    a. Three-way syringe tips.

    b. Saliva ejector coupling.

    c. Head rest covers.

    d. Bracket tray liners.

    e. HVE handle.

45. Which of the following should NOT be sterilized in an autoclave?

    a. Endodontic instruments.

    b. Carbon steel instruments.

    c. Hard rubber or nylon products.

    d. Stainless steel instruments.

46. Which of the following are sterilized using dry heat or chemical vapor under pressure? (More than one response may be correct.)

    a. Stainless steel instruments.

    b. Carbon steel instruments.

    c. Endodontic instruments.

    d. Plastic instruments.

    e. Burs.

47. Surfaces that are difficult to disinfect should be wrapped with _____ wrap or _____ foil.

48. Disinfection must be accomplished:

a. At the _____ and _____of each day.

b. _____patients.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 2

1. b (para 2-1a)

2. boiling; 30 (para 2-1b(2) Note)

3. a N
   b CD
   c CN
   d CD
   e N
   f CN (para 2-2)

4. (1) d
   (2) e
   (3) a
   (4) c
   (5) b (figure 2-1)

5. c (figure 2-1)

6. a (figure 2-1)

7. b (figure 2-1)

8. a distilled water
   b loosely
   c rust (para 2-4a)

9. a Cavitation
   b sterilize
   c 10; 15 (para 2-5)

10. a Soak
    b Clean
    c Rinse
    d Pat; dry (para 2-6b)

11. c (para 2-7b(2))

12. e (para 2-7b(2))

13. e (figure 2-2, para 2-8a(3))

14. a (figure 2-2)

15. a (para 2-8a(1))

16. d (para 2-8a(2))

17. b (paras 2-11c; 2-9)

18. b (para 2-11c)

19. a (para 2-9)

20. b (para 2-11b(1))

21. a (para 2-11b(2))

22. c (para 2-11d(6))

23. (1) c
    (2) a
    (3) b (para 2-13a)

24. b (2-13b)

25. a logbook
    b dust-free
    c LCN; expiration date (para 2-13c,d)

26. b, c (para 2-14b(1))

27. b (para 2-14b(4))

28. b (paras 2-14b(6); 2-15c(1),(2)

29. a blood; OPIM
    b red; biohazard
    c leakage; second (para 2-15a,d,c(3))

30. a 3-5
    b 15 (para 2-17)

31. Alcohols
    Quaternary ammonium compounds (para 2-19)

32. Iodophors
Glutaraldehyde
Chlorine compounds
Complex or synthetic phenols (para 2-20)

33. a (para 2-21)

34. a (para 2-21)

35. d (para 2-20c)

36. a (para 2-20b; figure 2-3)

37. c (para 2-20c)

38. d, e (para 2-20b,d)

39. d (para 2-19c)

40. a (Figure 2-3)

41. c (para 2-20d)

42. b (para 2-20b)

43. e (para 2-20e)

44. c, d (figure 2-4)

45. a (para 2-4a)

46. c, e (para 2-3)

47. plastic; aluminum (para 2-22c)

48. a beginning; end
b Between (para 2-22c)

End of Lesson 2

LESSON ASSIGNMENT

LESSON 3	Drugs in the Dental Clinic
TEXT ASSIGNMENT	Paragraph 3-1 through 3-32.
LESSON OBJECTIVES	After completing this lesson, you should be able to:

3-1. Identify basic terminology related to drugs and to drug usage.

3-2. Identify purposes and uses of local anesthetics.

3-3. Identify purposes and uses of analgesics.

3-4. Identify purposes and uses of antibiotics.

3-5. Identify purposes and uses of hypnotics and sedatives.

3-6. Identify purposes and uses of topical antiseptics.

3-7. Identify purposes and uses of hemostatics.

3-8. Identify the classification of specific drugs.

3-9. Identify dental specialist responsibility in relation to emergency kits and emergency aid.

3-10. Identify administrative procedures required for prescription writing.

SUGGESTION After completing the assignment, complete the exercises at the end of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 3

DRUGS IN THE DENTAL CLINIC

Section I. BASIC CONCEPTS

3-1. INTRODUCTION

Drugs are chemical agents that affect living tissues. They are given to patients to diagnose, treat, or prevent disease. Drugs may be derived directly from animal, plant, or mineral sources or may be prepared synthetically by chemical means. Although the dental officer is solely responsible for prescribing drugs involved in dental therapy, the dental specialist should be familiar with the various drugs used.

3-2. CLASSIFICATION OF DENTAL ITEMS

a. **Dose.** Dose is the amount of a drug that produces a specific concentration of the drug at a site, or the quantity to be administered at one time as a specified amount of medication. The following are descriptive terms concerning drug dosages:

(1) Therapeutic dose. A therapeutic dose produces the desired medical effect in the patient. It is in a dosage range between the minimum dose and the maximum dose.

(2) Toxic dose. A toxic dose is an overdose that causes poisoning.

(3) Lethal dose. A lethal dose is the amount of a drug that causes death.

b. **Drug Response.** The majority of patients who receive a drug will respond to it as expected. However, some patients may show a lesser or greater response to a given drug dosage.

c. **Side Effects.** A side effect is an action of a drug other than that specifically desired and is a response of an entirely different character. For example, a patient receiving an antihistamine, such as pyribenzamine for the treatment of hay fever, may experience drowsiness.

3-3. ROUTES OF ADMINISTRATION OF DRUGS

Drugs may be given to patients in any of the following ways:

a. **Orally.** By mouth, such as pills, tablets, capsules, and liquids. Drugs administered by the oral route are usually taken for their systemic effect. These medications must pass through the stomach and be absorbed in the intestinal tract. Orally administered medications are usually easy to take and are usually less expensive than other dosage forms.

b. **Intravenously (IV).** By injection, into the vein. The injection of a drug directly into the patient's veins is the most rapid route of administration.

c. **Intramuscularly (IM).** By injection, into muscle. The drugs are injected deeply into muscle tissue. If the drug is in aqueous (water) solution, absorption is rapid. However, if the drug is in an oily liquid or in the form of a suspension, it can prolong the action of the drug.

d. **Subcutaneously (Sub-Q).** By injection, under the skin. The drug is injected into the fatty layer under the skin but not into muscle. Absorption of the drug is rapid. Insulin is normally administered subcutaneously.

e. **Infiltration.** By injection, into the area next to the target tissue. The drug then diffuses and penetrates through the nerve sheath. When it contacts the nerve fibers, they become insensitive to pain and other sensations.

f. **Topically.** By application to the surface of skin, mucosa, or teeth. Topical anesthetic agents penetrate through the surface layers, eventually contacting the nerve endings and producing a loss of pain and sensations. They may be applied as an ointment, a solution, or a spray. Topical anesthetics are most often used to anesthetize the buccal mucosa at the site of an injection.

g. **Sublingually.** By placement under the tongue. The tablet is dissolved under the tongue or in the pouch of the cheek. (It is not swallowed.) Drugs administered in this manner are rapidly absorbed. Nitroglycerine in tablet form for heart patients is probably the most frequently administered sublingual drug.

h. **Inhalation.** By breathing a gaseous substance. Anesthetics, like nitrous oxide, are inhaled and exert their effect after absorption into the circulatory system. Sprays for nasal congestion generally have only a local effect on the tissue in the nose.

3-4. PHARMACEUTICAL TERMS

a. **Agent.** An agent is a substance capable of producing a physical, chemical, or biological effect.

b. **Allergy.** Allergy is a hypersensitivity to a drug. It can result in one or more of the following conditions.

(1) Anaphylactic shock. This refers to an acute, life-threatening allergic reaction characterized by low blood pressure, irregular heartbeat, bronchial spasms, cardiovascular collapse, and circulatory failure after contact with an allergen.

(2) Angioneurotic edema. This refers to a spontaneous swelling of the lips, cheeks, eyelids, tongue, soft palate, pharynx, and glottis, frequently associated with allergy to foods or drugs.

(3) Asthma. This refers to difficulty in breathing caused by spasmodic contraction of the bronchi.

(4) Syncope. This refers to a transient loss of consciousness caused by decreased blood supply to the brain (cerebral ischemia).

(5) Urticaria. Urticaria (hives) is a reaction pattern of the skin marked by transient appearance of smooth, slightly elevated patches that are either more red or pale than surrounding skin accompanied by severe itching.

c. **Analgesia.** Analgesia is the absence of sensitivity to pain, particularly the relief of pain without the loss of consciousness.

d. **Antidote.** An antidote is a remedy that counteracts a poison.

e. **Cartridge.** A cartridge is an enclosed glass cylinder containing a local anesthetic solution. Another word for cartridge is carpule.

f. **Chemotherapy.** Chemotherapy is the treatment of disease by chemical reagents that have a specific and toxic effect upon the germs or cells that cause the disease.

g. **Sedation.** Sedation is the production of a sedative effect, the act or process of calming by using drugs such as nitrous oxide and trichloroethylene. The patient remains conscious and retains protective reflexes. The patient experiences the following: disassociation of environment, reduction of pain, and dulling of memory of the treatment experience.

h. **Idiosyncrasy.** Idiosyncrasy is an abnormal response to a normal drug dose.

i. **Parenteral.** Parenteral refers to the administration of a drug by injection; for example, by subcutaneous, intramuscular, intravenous, or other non-gastrointestinal route of administration.

j. **Pharmacology.** Pharmacology is the science that deals with the study of the action of drugs on living systems.

k. **Pharmacotherapeutics.** This term refers to the study of the uses of drugs in the treatment of disease.

3-5. SUPPLEMENTAL INFORMATION

The following publications contain complete information on drugs, to include properties, actions, uses, average doses, dangers, and precautions. These are normally available for your reference in Army dental clinics.

a. *Physicians' Desk Reference to Pharmaceutical Specialties and Biologicals.*

b. The *Merck Index of Chemicals and Drugs.*

Section II. COMMON DRUGS

3-6. GENERAL.

A variety of drugs and chemicals are used in dentistry to aid in the diagnosis, treatment, and prevention of dental diseases. The appendix provides a listing of drugs that are commonly used in dentistry. It is recommended that you learn the characteristics of the approximately 35 drugs listed.

3-7. ANESTHETICS

a. **General Anesthetics.** General anesthetics are agents that produce a loss of consciousness, a loss of sensation throughout the body, and a reduction in muscular activity. They are used almost exclusively either as an inhalation anesthetic (such as ether, nitrous oxide, or Ethrane®) or as an intravenous anesthetic (such as sodium pentothal). General anesthesia is used to perform certain oral surgical procedures and to treat patients who can be best managed in the hospital environment.

b. **Local Anesthetics.** Local anesthetics are agents that reduce pain and sensation in a localized area of the body without loss of consciousness. This is accomplished by interfering with the transmission of a nerve impulse to the brain. The injectable local anesthetics are supplied in 1.8 cc cartridges, while the topical anesthetics are usually provided as ointments, gels, or liquids/sprays. When local anesthetics are used during treatment, the name and amount of the agent used is always entered on the Dental Health Record, SF 603. Local anesthetics used most commonly are:

(1) Lidocaine hydrochloride (Xylocaine®).

(2) Bupivacaine (Marcaine®).

(3) Mepivacaine hydrochloride (Carbocaine®).

NOTE: Pharmaceutical manufacturers use color coding systems to assist clinicians in the identification of various anesthetics used in their practice. The concentration of vasoconstrictors, for example, is identified by color coding, either the rubber stopper in each cartridge or by colored rings around the cartridge. It is advisable that the dental specialist become familiar with the different color coding systems.

3-8. VASOCONSTRICTORS IN LOCAL ANESTHETICS

Local anesthetics usually contain a vasoconstricting drug, such as epinephrine or levonordefrin (Neo-Cobefrin®). The addition of vasoconstrictors to local anesthetics is beneficial for the following reasons:

a. The anesthetic is retained in the area longer, resulting in a greater time and depth of anesthesia.

b. The toxic effect of the anesthetic is reduced since it is released into the general circulation more slowly.

c. The area of the injection will have less tendency to bleed.

3-9. METHODS OF ADMINISTRATION OF LOCAL ANESTHETICS

a. **Topical.** Topical anesthetics are applied to the mucous membrane or skin surface. They penetrate through the surface layers of the mucous membrane or skin, contact the nerve endings, and produce a loss of pain and sensation. Topical anesthetics may be used to anesthetize the buccal mucosa at the site of injection, to temporarily abolish a gag reflex, to relieve pain of certain lesions, or to relieve pain and discomfort of oral prophylaxis procedures. Topical anesthetics used most commonly are benzocaine and lidocaine (Xylocaine®).

b. **Block Anesthesia (Conduction Anesthesia).** The local anesthetic is injected into the area next to the nerve trunk (a major undivided portion of a nerve trunk). This blocks the passage of impulses to the brain from the area involved. This technique is most commonly employed in the mandible where the density of the bone renders infiltration ineffective. In the mandibular block, the anesthetic solution is placed near the mandibular foramen (where the inferior alveolar nerve trunk enters the mandible) to innervate the mandibular teeth. Thus, all of the mandibular teeth are anesthetized by the blockage of nerve impulses at a point some distance away from the teeth.

c. **Infiltration.** The local anesthetic is injected into an area that is to be surgically treated (see figure 3-1). The anesthetic then spreads to the nerve and passes through the nerve sheath. When it contacts the nerve fibers, they become insensitive to pain and other sensations. In dentistry, infiltration is used most often to anesthetize maxillary teeth for procedures such as restoration and extractions. The porous alveolar bone in the maxilla permits the anesthetic to spread to the nerves innervating the teeth.

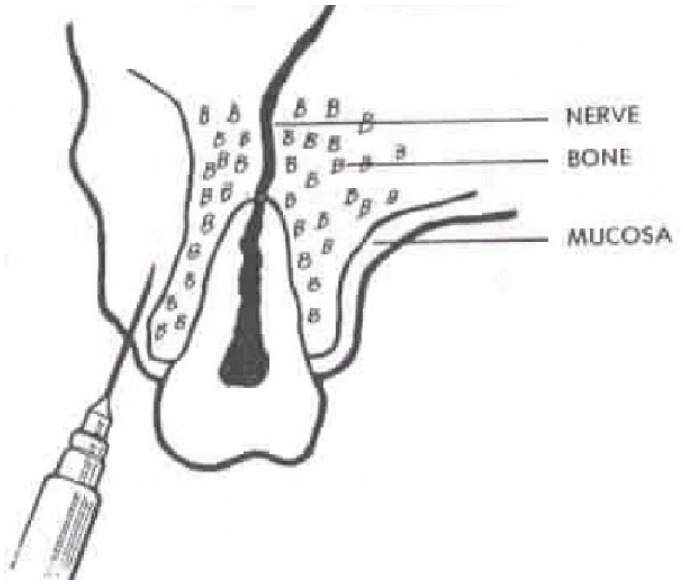


Figure 3-1. Anesthetic being deposited (infiltration).

3-10. ANALGESICS

Analgesics are agents used to relieve pain. They are classified as narcotic or non-narcotic and act chiefly to depress the pain systems of the nervous system. The most common use of analgesics is for the relief of pain following oral surgical procedures. Often the pain occurs after the patient has left the office and after the effects of the local anesthetic have worn off. For this reason, the dental officer will prescribe an analgesic and instruct the patient in its use. Differences in procedures and variations in patient response to pain require that a wide range of analgesic agents ranging from mild to potent be available to meet individual patient needs.

3-11. NARCOTIC ANALGESICS

a. **Codeine.** Codeine is an addictive narcotic derived from opium. Combined with other drugs such as aspirin or acetaminophen, codeine preparations are effective in relieving mild to moderate pain in the majority of dental problems. See the appendix for examples of compounds containing codeine.

b. **Morphine.** Morphine is a potent drug also derived from opium. It is used primarily in the hospital environment for relieving severe pain.

c. **Meperidine Hydrochloride (Demerol®).** Meperidine hydrochloride is an important drug employed in dentistry. It is a synthetic narcotic and has one-tenth the analgesic activity of morphine. Meperidine hydrochloride is sometimes prescribed for patients with moderate to severe pain who cannot tolerate codeine or morphine. It has a mild sedative action and potentiates the action of other sedatives. It is not prescribed together with monoamine oxidase (MAO) inhibitor drugs.

3-12. NONNARCOTIC ANALGESICS

a. **Acetylsalicylic Acid (Aspirin).** Aspirin (acetylsalicylic acid) is a widely used remedy for headaches, general muscular aches, and mild to moderate pain.

b. **Acetaminophen (Tylenol®)**. Tylenol® (acetaminophen) has the same relative potency as aspirin and is used by some patients in place of aspirin. It is used particularly by those patients who are allergic to aspirin or who cannot take aspirin for other reasons.

c. **Ibuprofen (Motrin®).** Motrin® (ibuprofen) is a non-steroidal, anti-inflammatory drug effective in the same situations as aspirin. It is prescribed when there is temporomandibular joint (TMJ) and myofacial pain dysfunction (MPD).

3-13. INHALATION ANALGESIA AND SEDATION

Inhalation analgesia and sedation using a nitrous oxide/oxygen combination is used more and more in dental therapy. Nitrous oxide is a sweet-smelling, colorless, nonirritating gas that is non-explosive, but will support combustion. The percentage of nitrous oxide to oxygen is very important and is carefully monitored by the dental officer. The gases are supplied in cylinders. Nitrous oxide cylinders are painted blue and oxygen cylinders are painted green. To reduce the potential for fires and explosions, oil or grease should never be used around this inhalation equipment. The dental specialist should check the tubing, inhaler, and reservoir for cracks and deteriorated rubber before each use. Escaped gas during dental therapy may be hazardous to the dentist and dental specialist when exposure is chronic.

3-14. ANTIBIOTICS-GENERAL

Antibiotics are agents that inhibit the growth of or destroy microorganisms. Antibiotics are used to combat infections by producing an effective blood level of the antibiotic and sustaining this level, usually for 5 to 10 days. Depending on the type of antibiotic and the type of infection, antibiotics can be administered orally, topically, and parenterally (see appendix). Penicillin, erythromycin, and tetracycline are the antibiotics most often used by dental officer.

3-15. PENICILLIN

Penicillin is effective against gram-positive bacteria, such as streptococci, and is used in the treatment of most dental infections (see the appendix). Many people are allergic to penicillin and care should be taken to prevent prescribing it for these patients. The dental specialist should review the patient's medical history to check for previous allergic reactions to penicillin. Patients with other allergies are more likely to be allergic to penicillin.

3-16. ERYTHROMYCIN

Erythromycin is effective against gram-positive bacteria including beta hemolytic streptococci, pneumococci, and staphylococci (see the appendix). This antibiotic resembles penicillin in its spectrum of antibacterial activity and is used as a substitute for penicillin for hypersensitive patients or for organisms resistant to penicillin. Erythromycin is relatively free of side effects; however, gastrointestinal upset often occurs.

3-17. TETRACYCLINE

Tetracycline is a broad-spectrum, mostly bacteriostatic, antibiotic effective against gram-negative and gram-positive bacteria (see the appendix). Both gram-negative and gram-positive bacteria are very common in the oral cavity. Normally, the dental officer will not prescribe tetracycline to pregnant women during the last three months (last trimester) of pregnancy or to children under the age of 12 (tooth development period). Tetracycline taken during these times may produce a permanent discoloration of teeth.

3-18. HYPNOTICS AND SEDATIVES-GENERAL

Hypnotics and sedatives are agents that produce sleep or decrease excitability by depressing the central nervous system. The degree of potency and effect of the agent is dependent upon the amount used. Small doses may produce a sedative effect; whereas larger doses may produce deep sleep (see the appendix). Hypnotic and sedative agents are used in dentistry to relieve patient apprehension, treat preoperative insomnia, induce sleep, and induce sleep in the presence of pain when combined with analgesics. Barbiturates and tranquilizers are two commonly used hypnotic and sedative agents.

3-19. BARBITUATES

These agents are grouped according to their duration of action. They depress the activity of the brain, producing sedation and sleepiness. (An example of a barbiturate is phenobarbitol.) Possible problems associated with the use of barbiturates are psychic and physical dependence, interactions with other medications, and accidental or intentional overdosage.

3-20. TRANQUILIZERS (ANTIANXIETY AGENTS)

Tranquilizers (antianxiety agents) are used to relax and calm a patient without depression of mental faculties or clouding of consciousness (see the appendix). Examples of tranquilizers used include hydroxyzine hydrochloride (Vistari®) and diazepam (Valium®).

3-21. TOPICAL ANTISEPTICS-GENERAL

Topical antiseptics are agents that stop or inhibit the growth of microorganisms without necessarily killing them. Topical antiseptics are applied to the oral mucosa for the control of minor infections and to root canals during endodontic therapy (see the appendix).

3-22. COMMON TOPICAL ANTISEPTICS

a. **Sodium Hypochlorite.** This solution, because of its solvent action on pulp tissue and organic debris, is often used for the irrigation of root canals.

b. **Iodoform.** Gauze and ointments impregnated with iodoform are used as antiseptic dressings in extraction sockets.

c. **Hydrogen Peroxide (3%).** This solution is used as a cleansing agent for suppurating (pus-producing) wounds and inflamed mucous membrane. It has some antiseptic effect.

d. **Phenol.** Phenol was once used extensively for disinfection of the prepared tooth cavity prior to insertion of a restoration. Today, it is used in root canal therapy and as an antiseptic in mouthwashes. An example is camphorated parachlorophenol (CPC).

e. **Eugenol (Oil of Cloves).** Eugenol is a topical antiseptic and pain reliever. When mixed with zinc oxide, it is used as a temporary restoration.

3-23. DESENSITIZING AGENTS

a. **Definition.** Desensitizing agents are defined as drugs that alleviate painful sensations that sometimes occur in exposed dentin and cementum.

b. **Types of Desensitizing Agents.**

(1) Fluoride. Fluoride (in the form of sodium fluoride, stannous fluoride, acidulated-phosphate fluoride, and so forth) is used in many preparations. Preparations include toothpaste, mouth rinse, topical gel, restorative materials, and many others. Fluoride is used in the treatment of hypersensitive dentin in the cervical areas of the tooth.

(2) Oxalates and varnishes. These materials can be used as liners under restorations. Both materials plug dentin tubules to prevent dentin sensitivity.

(3) Bonding resins and dentin adhesives. With the newer systems becoming more adherent to dentin, these materials have become very popular. Resins and adhesives are now designed to flow into dentin tubules to seal the dentin surface when they are set.

3-24. FLUORIDE COMPOUNDS

The effectiveness of fluoride compounds in lowering the incidence of dental caries is of utmost importance in the field of dental health. A reduction of dental caries is obtained by adding fluorides to the community water supply, by administering supplemental systemic fluorides, and by applying topical fluorides directly to tooth surfaces.

3-25. HEMOSTATICS

Hemostatics are agents that control bleeding.

a. **Absorbable Gelatin Sponge (Gelfoam®).** When this material is implanted in tissues, it promotes the disruption of platelets and acts as a framework for fibrin strands. It is used primarily to control capillary bleeding from within extraction sockets.

b. **Epinephrine.** This is an effective topical hemostatic agent for capillary bleeding. It is sometimes used in periodontal surgery in conjunction with a local anesthetic to reduce blood loss.

c. **Oxidized Regenerated Cellulose (Surgicel®).** This is a topical hemostatic agent used to control moderate bleeding.

3-26. MISCELLANEOUS DRUGS

a. **Aromatic Ammonia Spirit.** Aromatic ammonia spirit, usually administered by inhalation, is a reflex stimulant. This stimulant is used in the dental clinic to counteract a syncope (a brief loss of consciousness).

b. **Formocresol.** Formocresol is used in root canal therapy as a tissue fixative and antibacterial agent between dental appointments. It is also used as a fixative in a pulpectomy.

c. **Tincture of Benzoin.** Tincture of benzoin is sometimes used as a protective and local soothing agent for lesions of the oral mucosa.

d. **Vitamins.** Vitamins are a small group of organic compounds that are essential in small quantities to the health and maintenance of the body. Vitamin supplements are sometimes indicated for a patient, although usually, in a normal diet, the supply is adequate.

3-27. EMERGENCY KITS AND EMERGENCY AID

Although life-threatening emergencies in the dental clinic are rare, the dental specialist should be prepared for such events by being alert and knowledgeable. He should know exactly where to find the emergency kit that contains drugs and equipment used in emergency situations. He should ensure in advance that the drugs and equipment in the emergency kit are working properly. In addition, the dental specialist should know from which medical sources to obtain emergency aid. The dental specialist should ensure that he is competent and up-to-date in resuscitative procedures such as cardiopulmonary resuscitation (CPR). These procedures must be followed in accordance with local SOP.

Section III. ADMINISTRATIVE CONSIDERATIONS

3-28. GENERAL

Drugs must be used with care. The indiscriminant use of any drug, including aspirin, can be harmful. Guidelines and regulations must be followed for controlling and dispensing drugs.

3-29. CONTROL OF NARCOTIC ANALGESICS

Control of narcotic analgesics is accomplished by exercising precaution in prescribing or administering these drugs. This, of course, is the responsibility of the dental officer. Because of the records and reports involved in keeping narcotics, it is more convenient for the dental officer to write a prescription for narcotic medications to be filled by the pharmacy.

3-30. FIVE SCHEDULES OF CONTROLLED SUBSTANCES

a. **General.** The law that presently governs drug control and legal enforcement of drug laws in the United States is The Comprehensive Drug Abuse Prevention and Control Act of 1970. This act establishes five schedules of controlled substances, designated as Schedule I, II, III, IV, or V, depending largely on the drug's potential for abuse, medical usefulness, and degree of physical or psychological dependence. The appendix provides a listing of drugs commonly used in dentistry and describes some controlled substances that are not listed below as examples.

b. **Schedule I.** Schedule I substances have no accepted medical use in the United States, but have a high potential for abuse. Examples of Schedule I substances are heroin, marijuana, and lysergic acid diethylamide (LSD).

c. **Schedule II.** Schedule II substances have an accepted medical use and have a high potential for abuse. Examples of Schedule II substances are morphine, codeine, and Percodan® (trade name). Schedule II substances are classified as Code R substances in the Federal supply system.

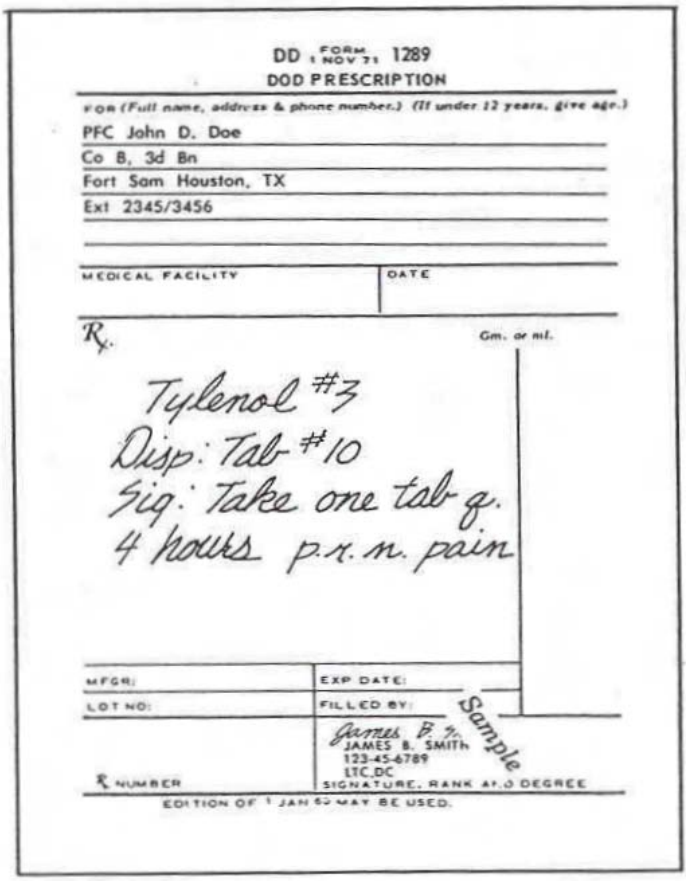
d. **Schedule III.** Schedule III substances have a lower potential for abuse than those listed in Schedules I and II. However, Schedule III substances may lead to moderate to low physical dependence. Examples of these substances are aspirin or acetaminophen compounds containing codeine (Tylenol #3 and Empirin with codeine). Schedule III substances are classified as Code Q substances in the Federal supply system.

e. **Schedules IV and V.** Schedule IV and V substances have decreasing potentials for dependence and abuse than those in previous schedules. Schedule IV substances include sedative-hypnotics such as chloral hydrate and phenobarbital and tranquilizers such as diazepam (Valium®). Schedule V substances include cough syrups. Both Schedule IV and V substances are classified as Code K substances in the Federal supply system.

3-31. PRESCRIPTION WRITING

a. **General.** A prescription is a written order from an authorized individual to a pharmacist directing him to furnish a certain drug to a patient. (See figure 3-2.) The prescription ensures proper control of substances since most substances are unobtainable without a prescription. Prescription writing should follow certain basic rules to ensure accuracy, simplicity, and accountability.

b. **Properly Prepared DD Form 1289.** A prescription should be stamped, typed, or written legibly in ink without erasures on a properly prepared DD Form 1289 (DOD Prescription).



DD FORM 1 NOV 71 1289

DOD PRESCRIPTION

FOR (Full name, address & phone number.) (If under 12 years, give age.)

PFC John D. Doe
Co B, 3d Bn
Fort Sam Houston, TX
Ext 2345/3456

MEDICAL FACILITY | DATE

℞ Gm. or ml.

Tylenol #3
Disp: Tab #10
Sig: Take one tab q.
4 hours p.r.n. pain

MFGR: | EXP DATE:
LOT NO: | FILLED BY:

Sample

James B. Smith
JAMES B. SMITH
123-45-6789
LTC,DC

℞ NUMBER | SIGNATURE, RANK AND DEGREE

EDITION OF 1 JAN 60 MAY BE USED.

Figure 3-2. Sample prescription.

c. **Patient Information and Date.** A prescription should include the date and the patient's full name, age, and organization or address. The patient's age is particularly important if the patient is a child or if a strong dose is prescribed.

d. **Dose and Amount of Drug.** A prescription should include the dose and the total amount of drug to be dispensed. The generic name or a suitable brand name may be used. When narcotics, barbiturates, and other substances that may be hazardous are prescribed, the total amount should be limited to that required for the immediate course of treatment.

e. **Direction for Use.** A prescription should include directions for use. Oral instructions must be confirmed on the prescription. A statement such as "use as directed" should not be used unless written instructions have been provided for the patient.

f. **Prescriber Information.** A prescription must include the signature and social security number of the dental officer.

3-32. SUPPLEMENTAL INFORMATION

a. **Pertinent Department of the Army Regulations.** Army Regulation (AR) 40-1, Composition, Mission, and Functions of the Army Medical Department, outlines the composition, mission, and functions of the Army Medical Department. Section II covers the composition of the Dental Corps, dental organization, duties of dental officers, and the application of narcotic licensing laws for dental officers.

b. **Pertinent Official Forms.**

(1) DD Form 1289 (DOD Prescription).

(2) DA Form 3875 (Bulk Drug Order).

(3) DA Form 3949 (Controlled Substances Record).

(4) DA Form 3949-1 (Controlled Substances Inventory).

Continue with Exercises

EXERCISES, LESSON 2

INSTRUCTIONS: Answer the following exercises by marking the lettered response that best answers the exercise, by completing the incomplete statement, or by writing the answer in the space provided at the end of the exercise.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced with the solution.

1. The action of a drug which is other than that specifically desired is a:

   a. Toxic dose.

   b. Therapeutic dose.

   c. Side effect.

2. The dosage range of a drug between the minimum dose, and the maximum dose, is a:

   a. Toxic dose.

   b. Therapeutic dose.

   c. Side effect.

3. The amount of a drug that causes death is a:

   a. Toxic dose.

   b. Therapeutic dose.

   c. Side effect.

   d. None of the above.

4. Nitroglycerin is most frequently administered:

    a. Orally.

    b. Topically.

    c. Sublingually.

    d. Subcutaneously.

    e. By inhalation.

5. Nitrous oxide is administered:

    a. By inhalation.

    b. Intramuscularly.

    c. By infiltration.

    d. Topically.

    e. Intravenously.

6. Insulin is normally administered:

    a. Sublingually.

    b. Topically.

    c. Intramuscularly.

    d. Orally.

    e. Subcutaneously.

7. Usually less expensive than other dosage forms and usually easier to take are medications administered:

   a. By infiltration.

   b. Topically.

   c. By inhalation.

   d. Orally.

   e. Sublingually.

8. When a drug is in an oily liquid or in suspension, the action of a drug can be prolonged if the drug is administered:

   a. Subcutaneously.

   b. Intramuscularly.

   c. Orally.

   d. Intravenously.

   e. Sublingually.

9. When a local anesthetic is injected near the target tissue and it diffuses and penetrates through the nerve sheath to the nerve fibers, the local anesthetic is administered:

   a. By inhalation.

   b. Subcutaneously.

   c. By infiltration.

   d. Topically.

   e Sublingually.

10. Match the description in Column I to the condition in Column II.

	COLUMN I: Description	COLUMN II: Condition
(1) ____	A reaction pattern of transient, smooth, and slightly elevated patches of skin, with severe itching.	a. Anaphylactic shock.
(2) ____	Transient loss of consciousness.	b. Angioneurotic edema.
(3) ____	Difficulty in breathing, caused by spasmodic contraction of the bronchi.	c. Urticaria.
(4) ____	Acute, life-threatening allergic reaction.	d. Syncope.
(5) ____	A spontaneous swelling of lips, cheeks, eyelids, tongue, soft palate, and so forth.	e. Asthma.

11. Which of the following routes of administration of a drug is NOT parenteral?

    a. Intravenous.

    b. Subcutaneous.

    c. Intramuscular.

    d. Topical.

12. "The relief of pain without the loss of consciousness" is the definition of:

    a. Analgesia.

    b. Sedation.

    c. Idiosyncrasy.

    d. Antidote.

13. "An abnormal response to a normal drug dose" is the definition of:

    a. Analgesia.

    b. Sedation.

    c. Idiosyncrasy.

    d. Antidote.

14. "The study of the uses of drugs in the treatment of disease" is the definition of:

    a. Pharmacology.

    b. Pharmacotherapeutics.

    c. Chemotherapy.

15. List two references available in Army dental clinics that provide complete information on drugs.

    a. The _____ to Pharmaceutical Specialties and Biologicals.

    b. The _____ Index of Chemicals and Drugs.

16. Ethrane is a:

    a. General anesthetic.

    b. Local anesthetic.

17. Sodium pentothal is an:

    a. Inhalation anesthetic.

    b. Intravenous anesthetic.

18. Is it a requirement to annotate on the Dental Health Record (SF 603) the name and amount of each local anesthetic used?

    a. Yes.

    b. No.

19. List the local anesthetics most commonly used in Army dental clinics.

    a. _____ hydrochloride (Xylocaine).

    b. Bupivacaine (_____).

    c. Mepivacaine hydrochloride (_____).

20. Local anesthetics usually contain a vasoconstricting drug. All of the following are reasons for this practice EXCEPT FOR:

    a. The anesthetic is retained in the area longer.

    b. The anesthetic is released more slowly into the general circulation.

    c. The area of injection will have less tendency to bleed.

    d. The anesthetic results in a loss of sensation throughout the body.

21. Select the drug that is NOT a vasoconstricting drug.

    a. Levonordefrin.

    b. Epinephrine.

    c. Ethrane.

22. Block anesthesia is used to anesthetize:

    a. Maxillary teeth.

    b. Mandibular teeth.

23. Infiltration is used most often to anesthetize _____ teeth for procedures such as extractions and restorations.

    a. Maxillary.

    b. Mandibular.

24. Select the drug that is NOT used as a topical anesthetic.

    a. Lidocaine (Xylocaine).

    b. Benzocaine.

    c. Bupivacaine.

25. Which class of chemical agents is used to relieve pain without dulling consciousness?

    a. Hypnotics.

    b. Local anesthetics.

    c. Tranquilizers.

    d. Analgesics.

26. Following oral surgical procedures, which of the following is most commonly prescribed?

    a. Antibiotics.

    b. Tranquilizers.

    c. Anti-inflammatory agents.

    d. Hypnotics.

    e. Analgesics.

27. Which of the following is a synthetic narcotic analgesic with mild sedative action?

    a. Codeine.

    b. Morphine.

    c. Meperidine hydrochloride.

28. Which of the following is used by patients who cannot take aspirin or who are allergic to aspirin?

    a. Acetominophen.

    b. Chloral hydrate.

    c. Empirin #3.

    d. Demerol.

    e. Motrin.

29. Cylinders painted blue that are used for inhalation analgesia and sedation contain:

    a. Oxygen.

    b. Nitrous oxide.

    c. Aromatic ammonia spirit.

    d. Helium.

    e. Sodium pentothal.

30. When an antibiotic is needed, the dental specialist should review the patient's medical history for previous allergic reactions to:

    a. Darvon.

    b. Eugenol.

    c. Benzocaine.

    d. Erythromycin.

    e. Penicillin.

31. Which of the following is more effective against gram-negative bacteria?

    a. Phenobarbitol.

    b. Penicillin.

    c. Erythromycin.

    d. Tetracycline.

32. Which of the following is used for organisms resistant to penicillin or as a substitute for penicillin for hypersensitive patients?

    a. Formocresol.

    b. Oxycodone.

    c. Erythromycin.

    d. Tetracycline.

33. Which of the following agents depress the activity of the brain, produce sedation and sleepiness, and pose a possible problem associated with accidental or intentional overdosage?

    a. Acetominophen.

    b. Barbiturates.

    c. Erythromycin.

    d. Atropine.

    e. Vitamins.

34. Which of the following is/are an antianxiety agent? (More than one response may be correct.)

    a. Epinephrine.

    b. Formocresol.

    c. Phenaphen #3.

    d. Diazepam.

    e. Hydroxyzine hydrochloride.

35. Which of the following is used in root canal therapy and as an antiseptic in mouthwashes?

    a. Camphorated parachlorophenol.

    b. Stannous fluoride.

    c. Sodium hypochlorite.

    d. Iodoform.

    e. Tincture of benz

36. Which topical antiseptic is used as a cleansing agent for suppurating wounds and inflamed mucous membrane?

    a. Eugenol.

    b. Phenol.

    c. Sodium hypochlorite.

    d. Iodoform.

    e. Hydrogen peroxide.

37. Which of the following is used in the treatment of hypersensitive dentin in the cervical areas of the tooth?

    a. Nitroglycerin.

    b. Acetylsalicylic acid.

    c. Sodium fluoride.

38. Which of the following is a topical hemostatic used to control moderate bleeding?

    a. Oxidized regenerated cellulose.

    b. Epinephrine.

    c. Absorbable gelatin sponge.

39. Select the drug that is used in a dental clinic to counteract syncope.

    a. Epinephrine.

    b. Aromatic ammonia spirit.

    c. Vistaril.

    d. Tincture of benzoin.

    e. Formocresol.

40. Complete information related to emergency aid.

    a. The dental specialist should know exactly where to find the _____.

    b. The dental specialist should ensure in advance that the _____ and _____ in the emergency kit are working properly.

    c. The dental specialist should know the _____ _____ to go to for emergency aid.

    d. The dental specialist should be up-to-date in _____.

41. Percodan is an example of a _____ drug.

    a. Schedule I.

    b. Schedule II.

    c. Schedule III.

    d. Schedule IV and V.

42. Substances that have an accepted medical use but also a high potential for abuse are classified as:

    a. Schedule I.

    b. Schedule II.

    c. Schedule III.

    d. Schedule IV and V.

43. Tylenol #3 and Empirin #3 are _____ drugs.

    a. Schedule I.

    b. Schedule II.

    c. Schedule III.

    d. Schedule IV and V.

44. Which of the following is classified as a Code K substance in the Federal supply system?

    a. Demerol.

    b. Empirin #3.

    c. Percodan.

    d. Phenobarbital.

    e. Phenol.

45. Which of the following is classified as a Code Q substance in the Federal supply system?

    a. Morphine.

    b. Darvon.

    c. Atropine.

    d. Atarax.

    e. Tylenol #3.

46. Complete information related to prescription writing.

a. A prescription should be stamped, typed, or written legibly in ink on a properly prepared _____ _____, _____ _____.

b. The _____ and the _____ _____ of drug to be dispensed should be included on the prescription.

c. The _____ name of the drug or a suitable _____ name may be used.

d. A prescription must include the signature and the _____ _____ _____ of the dental officer.

47. Which Army regulation covers the application of narcotic licensing laws for dental officers?

a. AR 40-1.

b. AR 40-2.

48. Match the title in Column II to the form number in Column I.

	COLUMN I: Form Number	**COLUMN II: Title**
(1) ____	DD Form 1289.	a. Controlled Substances Record.
(2) ____	DA Form 3875.	b. Controlled Substances Inventory.
(3) ____	DA Form 3949.	c. DOD Prescription.
(4) ____	DA Form 3949-1.	d. Bulk Drug Order.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 3

1. c (para 3-2c)

2. b (para 3-2a(1))

3. d (para 3-2a(3))

4. c (para 3-3g)

5. a (para 3-3h)

6. e (para 3-3d)

7. d (para 3-3a)

8. b (para 3-3c)

9. c (para 3-3e)

10. (1) c
    (2) d
    (3) e
    (4) a
    (5) b (para 3-4b)

11. d (para 3-4i)

12. a (para 3-4c)

13. c (para 3-4h)

14. b (para 3-4k)

15. a Physicians' Desk Reference
    b Merck (para 3-5)

16. a (para 3-7a)

17. b (para 3-7a)

18. a (para 3-7b)

19. a Lidocaine
    b Marcaine
    c Carbocaine (para 3-7b)

20. d (para 3-8)

21. c (para 3-8)

22. b (para 3-9b)

23. a (para 3-9c)

24. c (para 3-9a)

25. d (para 3-10)

26. e (para 3-10)

27. c (para 3-11c)

28. a (para 3-12b)

29. b (para 3-13)

30. e (para 3-15)

31. d (para 3-17)

32. c (para 3-16)

33. b (para 3-19)

34. d, e (para 3-20)

35. a (para 3-22d)

36. e (para 3-22c)

37. c (para 3-23b(1))

38. a (para 3-25c)

39. b (para 3-26a)

40. a emergency kit
    b drugs, equipment
    c medical sources
    d CPR (para 3-27)

41. b (para 3-30c)

42. b (para 3-30c)

43. c (para 3-30d)

44. d (para 3-30e)

45. e (para 3-30d)

46. a DD Form 1289, DOD Prescription
    b dose; total amount
    c generic; brand
    d social security number (para 3-31)

47. a (para 3-32a(1))

48. (1) c
    (2) d
    (3) a
    (4) b (para 3-32b)

End of Lesson 3

APPENDIX

DRUGS COMMONLY USED IN DENTISTRY

DRUG	CLASS	INDICATIONS (USE)	ADULT DOSE	ROUTE	POSSIBLE SIDE EFFECTS	CONTRA-INDICATIONS
Absorbable Gelatin Sponge	Hemostatic	Control post-extraction hemorrhage	As needed	Topical	None Significant	None Significant
Acetaminophen (Tylenol)	Nonnarcotic analgesic	To replace aspirin for mild pain, fever	300 to 1000 mg q 4 hrs	Oral	Allergy, nausea, toxic overdose	Kidney and Liver disease
Acetylsalicylic acid (Aspirin)	Nonnarcotic analgesic	Mild pain, fever	325 to 650 mg q 4 hrs	Oral	Allergy, nausea, toxic overdose, Reye's Syndrome	Peptic ulcer, anticoagulant therapy, kidney disease, children, or teenagers with flu or flu-like symptoms
Aromatic Ammonia Spirit	Reflux stimulant	Use to counteract syncope reaction	As needed	Inhalation	None Significant	None Significant
Atropine	Autonomic agent	Reduce salivation	0.4 to 0.6 mg	Oral	Fast pulse, dilated pupils	Pregnancy
Benzocaine	Topical anesthetic	Produce temporary loss of sensation on oral mucosa. Suppress gag reflex	As needed	Topical	Allergic response	Allergy
Bupivacaine	Local anesthetic	Infiltration and prolonged block anesthesia	Minimum effective dose	Injection	Allergic response, toxic depression	Known allergy
Codeine	Narcotic analgesic	Moderate pain	30 to 60 mg q 4-6 hrs	Oral	Nausea, constipation	Hypotension, head injury, bronchial asthma
Codeine with Acetaminophen (Tylenol #3 or Phenaphen #3)	Narcotic analgesic	Moderate pain	30 mg codeine, 325 mg Acetaminophen	Oral	Nausea, constipation	Hypotension, head injury, bronchial asthma
Codeine with Aspirin (Empirin#3 or Phenaphen #3)	Narcotic analgesic	Moderate pain	30 mg codeine, 325 mg Aspirin	Oral	Nausea, constipation	Hypotension, head injury, bronchial asthma

DRUG	CLASS	INDICATIONS (USE)	ADULT DOSE	ROUTE	POSSIBLE SIDE EFFECTS	CONTRA-INDICATIONS
Diazepam (Valium)	Sedative Hypnotic	Anxiety, tension, preoperative sedation	2 to 10 mg 2 to 4 times per day	Oral	Drowsiness, confusion, Avoid alcohol, operating vehicle, or machinery	Allergy, acute narrow-angle glaucoma
Eugenol	Nonnarcotic analgesic	Mixed with ZnO to make sedative base, or temporary restoration, pupal analgesia	As needed	Topical	Nausea	Allergy
Epinephrine	Vasoconstrictor, adrenergic	Used in local anesthetic to prolong anaesthesia, and provide hemostasis, treatment of severe allergic reactions	In dilutions of 1:50,000 to 1:250,000 with local anesthetics 1:1,000 for IV or IM injection	Injection (dental, IV or IM)	Systemic toxic reactions, tachycardia, arrhythmias	Pregnancy, hyperthyroidism, hypertension, recent heart attack
Erythromycin	Antibiotic	Infection, substitute for penicillin	250 to 500 mg, q.i.d.	Oral	Gastric distress	Allergy
Ethrane	General anesthetic	Operating room procedures	2 to 4.5% for 7 to 10 minutes	Inhalation	Hypotension, seizures	Lung disease
Fluoride	Topical	Makes teeth more resistant to decay	As needed	Topical	Toxic, if swallowed in large amounts	None Significant
Fluoride	Water additive	Fluoride added to drinking water results in teeth more resistant to decay	Optimum concentration of 1ppm in water	Systemic (oral)	Fluorosis of teeth (overdose)	Fluoride intake already optimum
Formocresol	Local antiinfective	Antibacterial agent in root canal treatment. Tissue fixing agent in pulpectomy technique	As needed	Topical	Severe mucosal or periapical irritation	Unable to isolate teeth
Hydroxyzine hydrochloride (Atarax, Vistaril)	Tranquilizer and sedative	Anxiety, tension, preoperative sedation	50 to 100 mg, q.i.d.	Oral	Drowsiness, dry mouth	Use of alcohol, operating vehicle, or machinery

DRUG	CLASS	INDICATIONS (USE)	ADULT DOSE	ROUTE	POSSIBLE SIDE EFFECTS	CONTRA-INDICATIONS
Hydrogen perioxide (3%)	Topical antiseptic	Wound irrigation	As needed	Topical	N/A	N/A
Hydrogen peroxide (30%)	Oxidizing agent	Vital and nonvital tooth bleaching	As needed	Topical	Chemical burns	Unable to isolate teeth
Ibuprofen (Motrin)	Oral analgesic, nonsteroidal anti-inflammatory agent	Mild to moderate pain, TMJ and MFP dysfunction	400 mg q 4-6 hrs: 800 mg q 8 hrs	Oral	Gastric irritation and neophrotoxi-city in high doses	Allergy to iodine
Iodoform	Topical antiseptic	Impregnated gauze for post extraction alveoli	As needed	Topical	N/A	None Significant
Levonordefrin (Neo-Cobefrin)	Hemostatic vasoconstrictor	Used with gingival retraction cord: also in local anesthetics to prolong anesthesia and provide hemostasis.	Dilution of 1:20,000	Injection	Systemic toxic reaction, tachycardia	Known allergy, Use with caution in pregnancy, hyperthyroidism, hypertension, recent heart attack
Lidocaine (Xylocaine)	Topical anesthetic	Produce temporary loss of sensation on oral mucosa.	As needed	Topical	Allergic response	Allergy
Lidocaine hydrochloride (Xylocaine)	Local anesthetic	Infiltration and prolonged block anesthesia	Minimum effective dose	Injection	Allergic response, toxic depression	Known allergy
Meperidine hydrochloride (Demerol)	Narcotic analgesic	For severe pain and as a substitute for morphine	50 to 150 mg q 4 hrs	Oral	Dizziness, nausea	Head injury, MAO drugs, severe liver disease
Mepivacaine hydrochloride (Carbocaine)	Local anesthetic	Infiltration and prolonged block anesthesia	Minimum effective dose	Injection	Allergic response, toxic depression	Known allergy
Morphine (morphine sulfate)	Narcotic analgesic	Severe pain	10-30 mg, q 4 hrs	Oral	Nausea, dizziness, constipation	Head injury, bronchial asthma, severe respiratory disease

DRUG	CLASS	INDICATIONS (USE)	ADULT DOSE	ROUTE	POSSIBLE SIDE EFFECTS	CONTRA-INDICATIONS
Nitrous Oxide	General anesthetic	Extended, complex surgery	15 to 75%	Inhalation	Hypoxemia	Lung diseases
Oxycodone or Oxycodoneride hydrochloride (Percodan, Percocet)	Narcotic analgesic	Severe pain	4.5 5 mg q 6 hrs with either 325 mg aspirin or 325 mg Acetamino-phen	Oral	Dizziness, sedation, high potential for abuse	Head injury, severe respiratory disease
Penicillin	Antibiotic	Infection, gram-positive organisms	500 mg q 4 hrs	Oral	Allergy, nausea, toxic overdose	Kidney and Liver disease
Phenol	Topical antiseptic	Irrigation of canal	As needed	Topical	Mucosal or skin irritation	Hypersensitivity
Propoxyphene hydrochloride (Darvon)	Synthetic narcotic analgesic	Mild pain	65 mg	Oral	In utero or infancy; permanent discoloration of teeth; skin rash	Should not take during pregnancy, or give to infants. Avoid milk products and antacids
Ticture of Benzoin	Obtundent	Irritated mucosal tissues	N/A	Topical	Contact dermatitis	Hypersensitivity

End of Appendix